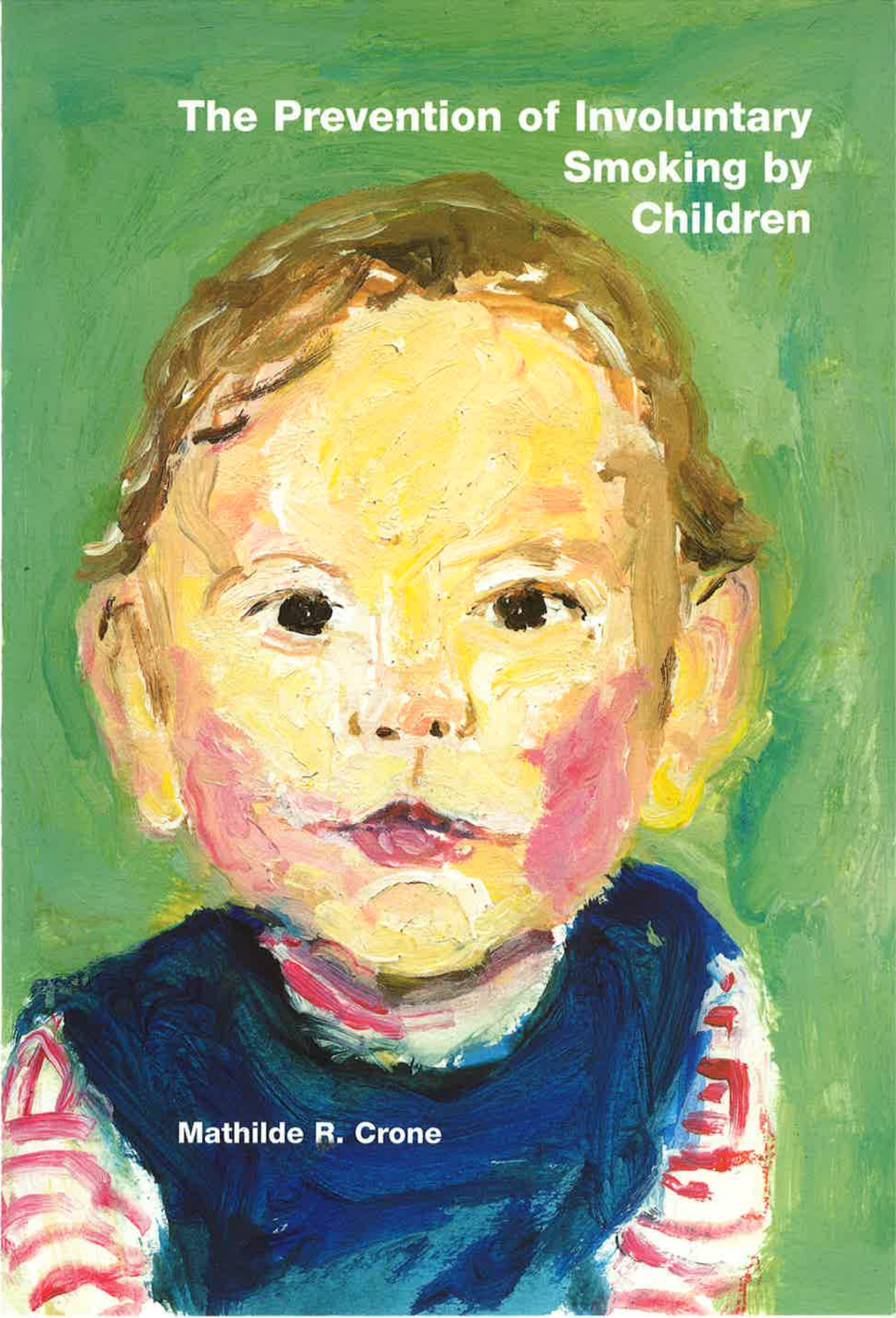
The Prevention of Involuntary Smoking by Children



Mathilde R. Crone

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Stellingen

Behorende bij het proefschrift
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1. Voorlichting over meeroken door kinderen is dermate effectief dat het moet worden opgenomen in het uniforme deel van het basistakenpakket Jeugdgezondheidszorg. *Dit proefschrift*

2. Het continue gebruik van preventieprogramma's binnen de gezondheidszorg vereist structureel onderhoud zowel op het niveau van de organisatie als op het niveau van de individuele zorgverlener. *Dit proefschrift*

3. De cotinine concentratie in bloed, speeksel of urine is een biologische maat om (mee)roken te meten, maar dit betekent niet dat het bepalen van deze concentratie een betrouwbaardere methode is om meeroken door kinderen te meten dan door ouders gerapporteerd rookgedrag. *Dit proefschrift*

4. In tegenstelling tot de gebruikelijke aanname leidt het roken door ouders niet automatisch tot het meeroken door hun kinderen. *Dit proefschrift*

5. Sociale druk kan er niet alleen toe leiden dat jongeren gaan roken, maar ook dat zij niet gaan roken. *Dit proefschrift*

6. Afstemming van preconceptionele, prenatale en postnatale zorg zal leiden tot een daling van de prevalentie van meeroken door het ongeboren en geboren kind. *Dit proefschrift*

7. Als ouders stoppen met roken wanneer hun kinderen nog jong zijn, roken die kinderen belangrijk minder vaak op latere leeftijd dan kinderen van ouders die niet stoppen. Als ouders stoppen met roken wanneer hun kinderen in de puberteit zijn, heeft dat weinig effect op het rookgedrag van die kinderen. *Farkas et al. Prev Med 1999;28:213-8.*

8. Rokende babies komen niet voor; meerokende babies helaas wel.

z.o.z

9. In gezinnen waar thuis gerookt wordt hebben katten bijna 2 ½ keer zoveel kans om lymfeklierkanker te krijgen als katten in gezinnen waar niet gerookt wordt. *Bertone et al. Am J Epidemiol 2002;156:268-73.*
Dus ook niet roken waar de kat bij is.

10. Baby binnen, buiten wieroken. *Fokke & Sukke, NRC, 24 dec 2002.*

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Contents

Introduction

This thesis deals with the prevention of exposure to tobacco smoke (passive smoking) in infants and young children. 'Exposure to tobacco smoke' means the inhalation of somebody else's smoke and the components it contains. The term includes the exposure of the unborn child to a mother who smokes but this topic is not discussed in this thesis because Bakker (2001) already covered it fully.[1] The present thesis focuses on the postnatal exposure of children to smoke from cigarettes, cigars and pipes. Young children are a special group in the context of passive smoking because they are almost always at home. Parental smoking behaviour is therefore the most important predictor for their exposure to tobacco smoke. The prevention of passive smoking in children should therefore focus on parents.

The aim of the research described in this thesis was to provide evidence for the development of education programs for preventing passive smoking among young children. Health education is a systematic activity and there are several planning models that can be used in the systematic development of health education. The model most often used is the PRECEDE/PROCEED-model.[2] PRECEDE/PROCEED is an acronym for 'Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation', followed by 'Policy, Regulatory and Organisational Constructs in Educational and Ecological Development'. This model includes all the objectives, resources, and levels of health education. A simplified version of the PRECEDE/PROCEED model is used in this thesis (Figure 1).[3]

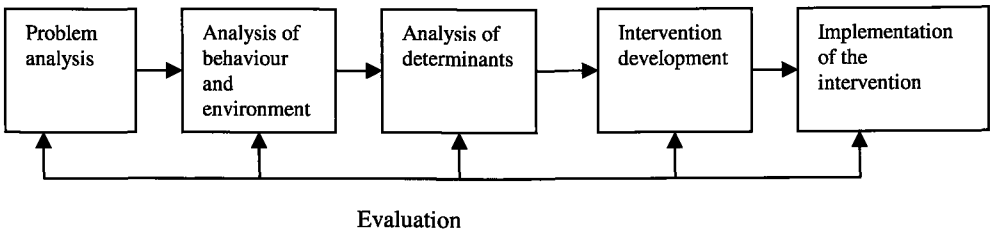

Figure 1: Simplified model of systematic health education (after Brug).[3]

The questions that operationalise the aim of this thesis are based on this simplified planning model. These questions are:

1. What are the health consequences of passive smoking in young children? (problem analysis)
2. What is the prevalence of passive smoking in young children? (analysis of behaviour and environment)
3. What are the best conditions for, and how feasible is, standardised education at well-baby clinics about passive smoking in young children? (analysis of environment)
4. Which factors influence parental smoking or parental approval of smoking in the presence of their child? (analysis of determinants)
5. What is the effect of a systematic education program on passive smoking in children? (intervention development)

6. What is the situation with respect to the continuation of use of this education program at well-baby clinics, and which antecedents affect continuation? (implementation of the intervention)

Besides trying to prevent passive smoking among children, it is also important to prevent active smoking among young people before they become parents. This can lead to a reduction in morbidity caused by passive smoking in childhood for subsequent generations. Therefore, this study also aims to prevent the uptake of smoking in early adolescence. It focuses, in particular, on adolescents with a lower level of education. This group starts to smoke early in life and is more likely to smoke during and after pregnancy. The research issue here is:

7. What is the effect of an education program for preventing the uptake of smoking among adolescents with a lower level of education? (intervention development)

These are the questions that will be answered in the subsequent chapters of this thesis. The first chapter provides an analysis of the problem. The prevalence of passive smoking among children is dealt with in Chapter 2. Chapter 3 looks at the role of the preventive child health-care sector in the prevention of passive smoking by children and the sector's opinions about preventing passive smoking. Chapter 4 deals with the factors that influence smoking in the presence of a child. Chapter 5 discusses the effects of an education program for preventing passive smoking. Chapter 6 looks at the results of the dissemination and continued use of this education program at Dutch well-baby clinics. Chapter 7 reports on the effects of a program for preventing the uptake of smoking by children. Finally, results are summarised and discussed in Chapter 8.

CHAPTER 1

Passive smoking among children and its prevention

This chapter summarises the available evidence about the sources of exposure to tobacco smoke in childhood (1), the health consequences of the exposure to tobacco smoke (2), and the prevalence of passive smoking in other countries (3). At the end of the chapter, there is a section about preventive child health care in the Netherlands, which is an important setting for the prevention of passive smoking among children.

SOURCES OF EXPOSURE TO TOBACCO SMOKE IN CHILDHOOD

Environmental tobacco smoke is a major source of indoor air contamination. It is a dynamic, complex mixture of more than 4,000 chemicals. All the compounds found in "mainstream" smoke – smoke inhaled by the smoker – are also found in "side stream" smoke, the emission form at the burning end of the cigarette, cigar, or pipe. Environmental tobacco smoke consists both of side stream smoke and exhaled mainstream smoke.[31] The intake of environmental tobacco smoke depends on the number of cigarettes smoked, the proximity of non-smokers to smokers, room ventilation and other environmental variables.[4]

The exposure of children to environmental tobacco smoke occurs most often at home. On average, the number of cigarettes smoked at home increases in proportion to the number of inhabitants who smoke. However, in households with no smokers, other people may also smoke, for example visitors. The younger the child, the greater the dependence on others and the more the child has to stay in the same room as his or her caretakers, and the more the child is exposed to tobacco smoke when the caretaker smokes in his or her presence. Most exposure at home occurs between 4 p.m. and midnight.[5] Passive smoking can be measured by the assessment of the amount of cotinine in serum, saliva or urine. On the basis of these measures, it has been calculated that a child of smoking parents smokes the equivalent of approximately 60 to 150 cigarettes annually.[6]

Children are usually not voluntarily exposed to tobacco smoke and younger children in particular are not able to say that the smoke bothers them. The involuntary aspect of exposure is a forceful additional reason for preventing passive smoking in children.

THE CONSEQUENCES OF SMOKING IN PRESENCE OF THE YOUNG CHILD

In recent years, the health consequences of passive smoking are becoming more evident. In the United States, approximately 3,000 non-smokers die of lung cancer each year because of passive smoking. In the Netherlands, approximately 110-270 persons die of lung cancer because of passive smoking.[7] In addition to the consequences for adults, the exposure to tobacco smoke can increase the risk of several health problems among children. In 1999, the World Health Organisation reported on the health risks of exposure to environmental tobacco smoke (ETS). A summary of their conclusions is presented in Table 1.

Table 1: Summary of the health risks of passive smoking in infancy according to the World Health Organisation.[8]

- ETS exposure is causally associated with increased risks of lower respiratory tract illnesses, including bronchitis and pneumonia, in the first years of life.
- ETS exposure is a cause of chronic respiratory symptoms in school-aged children.
- ETS exposure increases the severity and frequency of symptoms in children with asthma.
- ETS exposure is causally associated with increased risk of acute and chronic middle ear disease.
- Maternal smoking is a cause of small reductions in lung function. The predominant effect may be from smoking during pregnancy.
- ETS exposure of nonsmoking women during pregnancy is a cause of small reductions in average birth weight.
- Maternal smoking is a major cause of SIDS. The predominant effect is believed to be from *in utero* exposure. There is also some evidence that postnatal ETS exposure contributes to the risk of SIDS.
- Parental smoking is associated with learning difficulties, behavioural problems, and language impairment in their children. There is some evidence that both ETS exposure to nonsmoking women during pregnancy and children's postnatal ETS exposure may contribute to small impairments.
- ETS exposure is associated with physiological changes in children that may increase the risk of cardiovascular disease.
- There is suggestive evidence that parental smoking may increase the risk of some childhood cancers. However, the potential roles of preconceptional, *in utero*, and postnatal exposures are unknown.

The consequences of passive smoking among children, as worked out in this chapter, are based on this WHO summary but are supplemented by data on other health problems and include the most recent findings. The health consequences presented in this chapter can be divided into the following categories:

- asthma en respiratory illnesses;
- sudden infant death syndrome;
- ear infections;
- other.

Asthma and respiratory illnesses

A review on the prevalence of respiratory infections among elementary students between 1984 and 1995 estimate the 1995-prevalence of shortness of breath at 9%, that of recent wheeze at 12%, that of recent attacks of breathlessness with wheezing at 6%), and that for chronic cough at 4% to 6%.[9]

Lower respiratory problems

During the last twenty years, many studies have reported upon the link between parental smoking and passive smoking, and respiratory problems among children. Difranza calculated that 12% of the lower respiratory illnesses in children younger than

5 years are caused by passive smoking.[10] In the first of a series of systematic and quantitative reviews of health effects of passive smoking, Strachan and Cook studied the evidence relating passive smoking specifically to acute lower respiratory illnesses in the first two or three years of life.[11] They conclude that, although it is impossible to distinguish between the independent contributions of prenatal and postnatal maternal smoking, the increased risk associated with smoking by other household members suggests that exposure to tobacco smoke after birth is a cause of acute chest illness in young children. They also conclude that the relationship between parental smoking and acute lower respiratory illness in infancy is very likely to be causal.[11] In another review, the same authors conclude that there is strong evidence for a relationship between parental smoking and respiratory symptoms in school-age children.[12] A more recent case-control study indicates that children with Respiratory Syncytial Virus bronchiolitis had higher levels of serum cotinine in the acute stage than children in the post-bronchiolitis stage and children admitted to hospital with non-respiratory symptoms.[13]
Mannino et al. observed effects of exposure to environmental tobacco smoke in all child-age groups. They found significant effects of secondhand smoking, in terms of higher cotinine levels, in the past year among all children for wheezing, six or more days of school absence, and lung function decrements in forced expiratory volume.[14] Peat et al. estimate, from the data available from cohort and cross-sectional studies worldwide, that per 100,000 young children 500-2500 hospitalisations and 1000 to 5000 diagnoses due to respiratory infections can be directly attributed to parental smoking.[15] Recently Johansson et al. assessed that coughing more than two weeks after an upper respiratory infection, wheezing without upper respiratory infection as well as pooled respiratory symptoms differed significantly between children of non-smokers and indoor smokers.[16]

Asthma
Asthma is the most prevalent chronic disease among children. In 1999, the prevalence of asthma is estimated at 13% for children aged 0 to 3 and 11% for children aged 4 to 11 (Statistics Netherlands, Statline, 2000). A common feature of asthma is an increased sensitivity of the bronchial tubes. The mucous membrane that covers the bronchial tubes reacts to irritants such as dust, pollen, animal skin flakes, mould, and also tobacco smoke. Several studies have looked at the influence of environmental tobacco smoke on the development of asthma. According to a review by Difranza, 8% to 13% of cases of asthma can be attributed to the exposure of the child to tobacco smoke and 21% of the exacerbations of asthma.[10] Cook and Strachan conclude in their review on parental smoking and prevalence of respiratory symptoms and asthma in school-age children that wheezing and diagnosed asthma are more common among children of smoking parents. The pooled odds ratio for at least one smoking parent was 1.21 (95% Confidential Interval (95%CI): 1.10-1.34) for asthma.[12] In another review, the authors also analyse parental smoking and childhood asthma in longitudinal and case-control studies to assess the effect of parental smoking on the incidence, prognosis, prevalence, and severity of childhood asthma. They conclude that maternal smoking is associated

with an increased incidence of wheezing illness up to age 6 (pooled odds ratio: 1.31; 95%CI: 1.22-1.41), but less so after the age of 6 (pooled odds ratio: 1.13; 95%CI: 1.04-1.22). This excess incidence of wheezing among children in households where there is smoking appears to be largely non-atopic, with a relatively benign prognosis. Among children with asthma, however, parental smoking is associated with more severe disease.[17] This suggests that the evidence for a link between exposure to environmental tobacco smoke and asthma and wheezing is more closely related to tobacco smoke acting as a trigger, rather than as a cause, of asthma.
A recent study also confirms that involuntary smoke exposure increases severity and impairs lung function in a nationally-representative group of children with asthma in the United States.[18]

Lung function
In another review Cook et al. (1998) looked at the effect of passive smoking on lung function. They found that, in school-age children, the percentage reduction in forced expiratory volume in one second (FEV_1) was 1.4% (95%CI: 1.0-1.9) in children exposed to parental smoking compared to those not exposed. Maternal smoking in particular is associated with decreased FEV_1. The authors concluded that this effect may be largely due to maternal smoking during pregnancy. [19]

Sudden infant death syndrome (SIDS)
SIDS is defined as a medically unexplained death of the infant. In the Netherlands, there have been approximately 13 cases of SIDS per 100,000 infants since 1998. It is likely that the immediate cause of death in SIDS is a functional one acting through the cardio respiratory system. In 1996, Blair et al. estimated that after controlling for all other risk factors for SIDS, such as sleeping position and parental bed sharing, the independent attributable risk for smoking by at least one parent on SIDS was 61.2%.[20]
According to a review by Anderson and Cook (1997), maternal smoking doubles the risk of sudden infant death syndrome. They conclude that there is good evidence that postnatal exposure to environmental tobacco smoke from both the mother and the father is important. They also conclude that prenatal smoking is almost invariably associated with postnatal smoking. The role of prenatal smoking alone will therefore be difficult to resolve.[21] In 1999, Dwyer et al. showed that the strongest predictor of sudden infant death is maternal smoking, though the effects of prenatal and postnatal smoking could not be separated.[22] A recent Dutch publication reports that 40% of the mothers and 50% of the fathers of SIDS infants smoked. This is significantly higher than the percentage for the general Dutch population. In the general Dutch population, 27% of women and 33% of men were smokers in 2001.[23; 24] The mothers of SIDS infants also smoked more cigarettes a day. According to these Dutch data, the adjusted relative risk for SIDS is 1.7 (95%CI: 1.0-2.7) for one smoking parent. With two smoking parents, the risk is doubled to a relative risk of 3.3 (95%CI: 2.0-5.3).[23]

Ear infection

Acute otitis media is an infection of the middle ear. In general it lasts less than three weeks and can be accompanied by earache and fever. Acute otitis media is the most prevalent acute disease in early childhood. At the age of 12 months, approximately 30% of children have had at least one period of otitis media and at the age of 4 approximately 60% to 65% have had at least three periods of ear infections. These ear infections can lead to surgical interventions such as tonsillectomy or grommets. They can also lead to difficulties with language, speech retardation, hearing loss, chronic middle ear effusion, mastoiditis, meningitis, and sepsis. In a review by Strachan and Cook, the pooled odds ratios for middle ear disease if either parent smokes are 1.48 (95%CI: 1.08-2.04) for recurrent otitis media, 1.38 (95%CI: 1.23 to 1.55) for middle ear effusion (glue ear), and 1.21 (95%CI: 0.95-1.53) for outpatient or inpatient referral for glue ear. The odds ratios for acute otitis media are in the range of 1.0 to 1.6.[25]

Other consequences

Learning and behavioural problems

Children of smokers do less well at school compared to children of non-smokers. They have a lower score on the cognitive functioning tests, especially for language and speech processes. They also have more behavioural problems, including hyperactivity and impaired concentration. Most studies have corrected their findings for demographic characteristics. However, it is difficult to correct for every possible factor that may influence the results. Some studies report a dose-response relationship: they found more problems in children with a higher exposure to tobacco smoke. The effect of exposure to tobacco smoke on cognition and behaviour is, however, still not sufficiently clear.[26]

Cancer

There is some evidence of an increased risk of childhood cancers caused by passive smoking. A meta-analysis by Bofetta et al. (2000) indicates that the results for exposure to maternal tobacco smoke before or after pregnancy are too sparse to allow a definitive conclusion. However, the results for exposure to paternal tobacco smoke suggest an association with brain tumours and lymphomas. Bofetta et al. conclude that further studies are needed to be able to confirm that parental tobacco smoke, in particular from the father, is a risk factor for childhood cancer.[27] The results of an international case-control study published in 2002 indicate that there is no association between the risk of brain tumours in children and parental smoking prior to pregnancy, maternal smoking or regular exposure to others' cigarette smoking during pregnancy, or passive smoking by the child during the first year of life.[28] In the same year, an article was published on the effects of environmental tobacco smoke on malignant lymphoma in pet cats.[29] This study shows that cats have an increased relative risk of malignant lymphoma if there is any household exposure to environmental tobacco smoke (rr: 2.4; 95%CI: 1.2-4.5) and that this risk increases with both duration and quantity of exposure. The authors conclude that a further study of this relation in humans is warranted.[29]

Cardiovascular diseases
There is also some evidence that passive smoking in childhood lowers the concentration of High Density Lipoproteins (HDL). A lower HDL concentration is an established risk of cardiovascular disease. In studies among adults, the level of HDL is 3 to 8% lower in male smokers compared to male non-smokers and 11 to 13% lower in females smokers compared to female non-smokers.[30; 31] In a twin study in 1990, Moskowitz et al. found significant adverse changes in systemic oxygen transport and lipoprotein profiles in preadolescent children exposed for long periods to passive cigarette smoke, primarily maternal smoke.[32] In another study, in 1999, Moskowitz concludes that children aged 11 years with long-term ETS exposure have lower HDL-C levels.[33] The results of a cross-sectional study also suggest that passive smoking, like active smoking, leads to alterations in lipid profiles predictive of an increased risk of cardiovascular diseases.[34]

Excessive infant crying
In a study of 3345 children aged 1-6 months, the prevalence of infantile colic (excessive infant crying) is twice as high in infants of smoking mothers, but lower in breastfed infants.[35] This association is consistently found for infantile colic defined in various ways.[35] A similar association between maternal smoking and infantile colic was also found in a study published in 2001.[36] It is still unclear if this increased risk is due to either prenatal or postnatal exposure of the child to tobacco smoke.

Meningococcal disease
Meningococcal disease is caused by a bacterium, meningococcus, which can cause infections such as meningitis, septicaemia, pneumonia, arthritis and other, rarer types of infections involving the heart, eye, or other parts of the body. Some case-control studies have found a relationship between meningococcal disease among children and passive smoking.[37-40] Fisher et al. found a dose-response effect for passive smoke exposure and risk of the meningococcal disease in all age groups.[39]

Poisoning
Although it is not a direct result of the exposure to environmental tobacco smoke, poisoning by swallowing cigarettes is a result of smoking. A study by Petridou et al. reveals that chewing and swallowing cigarettes causes 15% of all cases of poisoning among children. All these children had to be hospitalised for 24 hours or longer. The main symptoms of swallowing cigarettes are a rapid heartbeat and vomiting.[41] In 1995, the American Association of Poison Control Centres received 7917 reports of poisoning due to exposure to tobacco products in children of 6 years and younger. Eating the butt of a cigarette or cigar causes most nicotine poisoning cases.[43] In the Netherlands, 5-7% of poisonings are caused by eating cigarettes.[42]

The onset of active smoking
Parental smoking behaviour influences children's smoking behaviour at a later age. Parents are examples for children in how they deal with smoking, in their approval and

disapproval of smoking. When parents smoke, the child is exposed to tobacco smoke and also to the smoking behaviour of persons who are important role models in their social environment. Children of smoking parents start to smoke more often,[44; 45] especially when parents have not implemented home smoking bans.[46; 47]

The health problems described above are all related - some on the basis of strong evidence - to the exposure of children to tobacco smoke. Parental smoking, as well as the smoking behaviour of others, may have consequences in the short and in the long-term. Not only does it have direct health consequences, it can also lead to unhealthy behaviour among children themselves since it is a factor in smoking uptake. These consequences emphasise the importance of reducing or limiting exposure to tobacco smoke in young children.

PASSIVE SMOKING BY CHILDREN IN OTHER EUROPEAN COUNTRIES

A regional Dutch study conducted in 1992 indicates that, in 50% of the households, at least one person smoked. In 42% of households, people smoked in the presence of the child in the living room and, in 12% of households, people smoked in the car in the presence of the child.[48]

A literature study was conducted to establish a picture of the prevalence of passive smoking in other Western European countries. Table 2 sets out the data on the prevalence of passive smoking in other European countries. It is confined to national data on self-reported passive smoking among children.

The prevalence of self-reported passive smoking has been measured in different ways. In the Nordic countries, passive smoking is measured by asking about the exposure of the child to environmental tobacco smoke in the last week or year. In other countries, passive smoking is measured by asking if parents or other household members smoke. The prevalence of passive smoking between countries is therefore difficult to compare. Comparisons are only possible for the Nordic countries. Here, child exposure to tobacco smokes varies from 8% in Finland to 48% in Denmark. The Dutch regional study from 1992 reports a prevalence of passive smoking (42%) comparable to Iceland and Denmark. These regional prevalence data in 1992 stress the importance of the development of activities to prevent passive smoking. More recent national prevalence data on passive smoking, however, are needed to confirm the importance for the development of activities to reduce passive smoking among children.

Table 2: Prevalence of passive child smoking and of maternal and paternal smoking measured by self-reports in European countries.

Country	Passive infant smoking	Age	N	Date	Maternal smoking	Paternal Smoking	Phrasing of the question
Germany[49]	55%	0 - 5 years	2538 women	1984 – 1992	34%	45%	At least one parent smokes
Germany[50]	59%	<2 years	30 households	1987	19%	34%	Children with at least one smoker in the household
Germany[50]	50%	2 - 5 years	71 households	1987	32 %	43%	Children with at least one smoker in the household
Germany[50]	68%	6 – 13 years	148 households	1987	31%	48%	Children with at least one smoker in the household
Finland[51]	25%	1 - 6 years	1003 parents	1991	22%	30%	Smoking indoors regularly in the past 12 months
Finland[52]	8%	Children born in 1992 Age 5 years	691 households	1997	26%	36%	Household in which children are exposed to ETS during the course of a week
Sweden[52]	15%	Children born in 1992 Age 5 years	700 households	1997	18%	21%	Household in which children are exposed to ETS during the course of a week
Norway[52]	32%	Children born in 1992 Age 3 years	609 households	1995	37%	35%	Household in which children are exposed to ETS during the course of a week
Iceland[52]	46%	Children born in 1992 Age 5 years	702 households	1997	33%	33%	Household in which children are exposed to ETS during the course of a week
Denmark[52]	48%	Children born in 1992 Age 4 years	845 households	1996	31%	26%	Household in which children are exposed to ETS during the course of a week
Sweden[16]	7%	Children born between 1-4-94 and 31-5-1995. Age 12-24 months	1600 children	1996	14%	15%	Indoor smoking

PREVENTIVE CHILD HEALTH CARE IN THE NETHERLANDS

In the Netherlands, preventive child health services are the most appropriate settings for providing education about passive smoking and active smoking. These services provide prevention programs for children from birth up to the age of 18 years.

The organisation of preventive child health care

In the Netherlands, the preventive health care services are organised separately from the curative health care services. In 1995, when the first study for this thesis started, preventive health care for children consisted of two separate sections: pre-school health care and school health care. Starting from 2003, the organisation of preventive child health care has changed. These changes will be described in a separate paragraph.

Pre-school health care

The pre-school health care system provides screening and vaccinations for all 0-4 year-olds in the Netherlands, advises parents about nutrition and lifestyle, answers questions from parents, monitors growth, psychomotor development and the development of speech and communication.[53] Pre-school health care is provided by physicians and nurses in the well-baby clinics which are a part of the home-care organisations. In the pre-school period, between 97% and 80% of all four-year-olds visit well-baby clinics regularly. Until 2003, the pre-school health care was financed and organised by the national government.

School health care

School health care for 4-18 year-olds is provided by health community centres (GGD) and is financed and organised by the municipalities, expect the vaccination program, which is organised by the national government. Almost all community health services provide individual examinations by school doctors or nurses. In addition to these individual examinations of the children, specific activities are organised in schools with respect to health, health risk and health education.[53]

The organisation of preventive child health care from 2003

With effect from January 2003, there was a change in the organisation of preventive child health care in the Netherlands.[54] Starting from then, pre-school health care is also directed and financed by municipalities in the same manner as school health care already was. The only exceptions concern vaccination and screenings on phenylketonuria, congenital hypothyroidism, and congenital adrenal hyperplasia, which remain financed nationally. The actual delivery of services may also be changed, but at the moment of writing this text (February 2003) home-care organisations still provided pre-school health care in most regions. At the same moment, central government codified a minimum level for preventive child health care, known as the Package of Basic Tasks of Preventive Child Health Care (Basistakenpakket Jeugdgezondheids-zorg).[54] In the description of those Basic Tasks, a distinction is made between standard tasks and tailor-made tasks. The standard component consists of services that should be provided to all individuals in the target group (children and adolescents from 0 to 19

years old), or to nationally determined parts of the target group. Preventive activities have to be shown being effective before they can be included in this standard component of the Basic Tasks. Policy and decisions of the municipality have no influence on this standard component. The tailor-made component consists of services that municipalities can provide at their discretion in accordance with the needs of the individuals in their municipality: the health situation of the local population and local providers determine the health care to be provided. Thus, the national government decides on the contents of the standard component and the municipalities decide on the contents of the tailor-made component. Both the standard and the tailor-made component have been divided into six groups of services:

Group 1: Monitoring and surveillance
Group 2: Determining needs
Group 3: Screening and vaccinations
Group 4: Education, advice, instruction and guidance
Group 5: Influencing of health risks
Group 6: Health-care system, networking, consultation and co-operation

In the Basic Tasks Package as it is now, all health education activities have been defined as tailor-made activities. The only standard educational activity concerns the provision of information to clients on their legal rights regarding the provision of health care. Evidence on the effectiveness of child health education programs can support their inclusion in the standard part of the Basic Tasks Package, however. The research as presented in this thesis can be expected to contribute to this evidence. In Chapter 8 of this thesis, the position of the prevention of passive smoking and active smoking among children within this Basic Tasks Package will be discussed further, taking into account the evidence as provided by the studies reported on in the next chapters.

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CHAPTER 2

Prevalence of passive smoking among children

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ABSTRACT

The objective of the study was to assess the prevalence of passive smoking in infancy This was done by self-report questionnaires completed by parents who attended the well-baby clinic in the period February - May 1996. 2,720 questionnaires were spread among parents with babies between 1 and 14 months: smoking and non-smoking parents.

The questionnaires contained questions on smoking habits, smoking at home, smoking in presence of the baby 1,702 parents filled in and returned the questionnaire (63%). 24% of the mothers and 33% of their partners smoked. In 44% of the families, one or more persons smoked. 22% of the mothers and 26% of the partners smoked at home. In 39% of the families, one or both parents smoked at home. 42% of the babies were exposed to tobacco smoke in the living room, 8% were exposed in the car, and 4% during feeding. In cases where only the mother smoked, 13% of the infants were exposed to tobacco smoke during feeding. In the families where only the partner smoked, the babies were predominantly exposed to smoke in the car (18%). When both parents smoked, the child was most frequently exposed to tobacco smoke in the living room (73%).

It can be concluded that health workers, nurses, paediatricians and family physicians should be advised to inform parents systematically of the harmful effects of passive smoking in infancy. If parents are unable or unwilling to stop smoking, it is important to advise them to refrain from smoking in the presence of the baby.

INTRODUCTION

Smoking is the major cause of premature death in developed countries. Active smoking can cause cardiovascular diseases and lung carcinoma.[1] To a lesser extent, other diseases are also related to active smoking, examples being other forms of cancer, chronic respiratory illnesses, low birth weight and high perinatal mortality among infants.[2]

In recent years, several studies have been performed on passive smoking among adults, pregnant women and children. Passive smoking in infancy also seems to be an important risk factor for a variety of diseases, for example respiratory illness.[3] Long-term passive smoking can induce a predisposition towards chronic respiratory illness.[4] Furthermore, passive smoking in infancy can also cause otitis media with effusion.[5] Due to a reduction of other major risk factors (like prone sleeping), 60% of sudden infant deaths are now associated with passive smoking.[6]

The objective of the present study was to assess the prevalence of smoking among parents and others in the presence of babies.

METHODS

The study was set up as a cross-sectional design. The research population consisted of infants who had attended a well-baby clinic between February and May 1996. In the Netherlands well-baby clinics are run by home-care associations and they are attended by 95-98% of all infants. The infants in the study were aged between 1 and 14 months.

Sixteen home-care associations were asked to participate in the study, one from each of the four main cities of the Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht) and one from each province. Eventually 14 organisations participated, 4 from the main cities and 10 provincial associations. Each organisation was asked to select five well-baby clinics at random, which subsequently received 40 questionnaires.

The first 40 parents who visited the well-baby clinic and agreed to take part in the study both smoking and non-smoking parents were asked to complete a structured questionnaire. Parents were excluded in case they could not read or write the Dutch language. The reason for this was that the questionnaire was in Dutch and the information material for parents will first be developed in the Dutch language. The questionnaire contained questions concerning smoking habits: smoking at home by the parents or by others (friends, family) and smoking behaviour in the presence of the baby. The parents were asked about smoking in the presence of the child in the living room, in the children's bedroom, in the car and during feeding. Furthermore, it contained questions about smoking before and during pregnancy.

The parents were asked to complete the questionnaire at home and return it in a free-post envelope. Parental age was classified into 6 groups: below 20, 20-24, 25-29, 30-34, 35-39 and 40 or older. Socio-economic status was measured by the educational attainment of the parents and divided into three groups:

- A lower SES: primary and junior education.
- A middle SES: secondary education.
- A higher SES: vocational colleges and university.

The results were analysed using the statistical program SPSSX. Means and χ^2 were calculated. A difference was considered statistically significant when $\alpha<0.05$.

RESULTS

A total of 2720 parents were asked to participate and complete the questionnaire. 1702 parents (63%) returned the questionnaire. Ninety-one percent of the questionnaires were completed by the mother, 9% by the father. This is the reason why this article only presents the results reported by the mothers (n=1551). The average age of the children was 6 months. The average age of the mothers was 31 and the average age of the partners was 33. The average age of the mothers was higher than the average age of mothers of children born in the Netherlands.[7] This difference was significant (χ^2=73.8, p=0.000). Sixty-one percent of the mothers had a middle or high socio-economic status. This is significantly different from overall distribution of the socio-economic status of women in the Netherlands (χ^2=42.4, p=0.000).[8]

Smoking before and during pregnancy

Six months prior to pregnancy, 30% of the women questioned smoked. 5% stopped smoking before becoming pregnant and another 4% stopped smoking during pregnancy. A total of 21% of the mothers therefore smoked during pregnancy. After the birth, 3% started smoking again after an average of one month.

Smoking

Twenty four percent of the mothers and 33% of their partners smoked (Table 1). A total of 44% of the babies were exposed to one or more smokers in the family. In the questionnaire was also asked if friends and family smoked: the reason is that they also can be the cause to second hand smoking by the child. Eighty five percent of the mothers stated that family (i.e. mother, father, sister, etc. of the respondent or partner) and friends smoked. Mothers and partners with a lower socio-economic status smoked more often (mother χ^2=79.06, p=0.000; partner χ^2=74.62, p=0.000). When both the mother and partner smoked, they smoked between five and 15 cigarettes a day on average.

Table 1: Percentage of smoking mothers and partners

Cigarettes a day	Mothers %n, n=1551	Partners %n, n=1503
Non-smoker	76	67
Less than 5	5	7
5 – 14	14	12
15 or more	5	13
>15	3	1

Smoking at home

Thirty nine percent of the mothers said they and/or their partners had smoked at home in the past seven days. Eleven percent of the mothers who smoked (2% of the total population) and 18% of the partners who smoked (7% of the total population) did not

smoke at home. Eighteen percent of the family who smoked and 13% of friends who smoked refrained from smoking at home. Smoking at home was more frequent among mothers and partners with a lower socio-economic status (mother χ^2=26.01, p=0.002; partner χ^2=44.06, p=0.000). Mothers smoked more cigarettes and more frequently at home than the partners.

Table 2: Prevalence of smoking at home by mothers and partners

Cigarettes a day indoors	Mothers. %n, n=1551	Partners. %n, n=1503
Non-smokers	76	67
No indoor smokers	2	7
< 5	5	12
5 – 14	14	13
>15	3	1

Smoking in the presence of the baby

Twenty three percent of the smoking mothers said they never smoked in the presence of the baby. On average, 42% of the families smoked in the living room in the presence of the infant. In Table 3, smoking in the presence of the child was divided into two groups: one group with smoking mothers and one group with non-smoking mothers. In the families where the mother smoked, the baby was most frequently exposed to tobacco smoke in the living room, in the car, in the child's bedroom and during feeding. In all, 53% of smoking mothers and 35% of the non-smoking mothers said that they aired the living room after smoking there. In the car, 73% of the smoking mothers and 60% of non-smoking mothers said they opened the window when smoking in the presence of the baby.

Table 3: Prevalence of smoking in presence of the baby in the seven days before completing the questionnaire if mother did or did not smoke

Smoking In presence of the baby in:	mother smoker	mother non-smoker	%n, n=1515
The car	12	4	8
The child's bedroom	0.4	0	0
The living room	72	32	42
During feeding	9	2	4

DISCUSSION

The response in this study was 63%. This is lower in than comparative studies. Little is known about the non-response group, but dropouts are usually considered as smokers in the literature. Therefore, it is not possible to exclude the possibility of bias in the results.

On average, the mothers in this study were significantly older than mothers of new-born babies in the Netherlands.[7] On average they had received more education than women in the Netherlands as a whole.[8] Another Dutch study showed that smoking

decreases with increasing age and more education.[9] This could mean that the results of the present study are an underestimate and that smokers are not fully represented.
The prevalence of smoking among mothers (24%) was lower than in a 1992 study in one province of the Netherlands (28%).[10]
The percentage of women who smoked six months before pregnancy corresponds closely to the average percentage of smoking women in the Netherlands in 1996 (30% versus 32%).[11] The percentage of women smoking during pregnancy is lower than those who stated that they smoked before pregnancy and this corresponds to findings from other studies.[9;10] A reason for the difference between the prevalence of smoking before and during pregnancy may be that mothers are more or less aware of the consequences of smoking for the unborn child. In the Netherlands the Dutch Foundation of Smoking and Health has already took the initiative to develop an information program to prevent smoking in pregnancy and, at the moment, the University of Maastricht is evaluating a program which focuses not only on the pregnant woman but also on her partner. This existing anti-smoking information for pregnant women is a possible explanation for the fact that the percentage of women who smoke after pregnancy is higher than during pregnancy but lower than just before pregnancy or six months pregnancy. After the birth, some mothers return to their old smoking habits. They seem to find it important for the health of the unborn child to refrain from smoking during pregnancy, but this consideration ceases to apply after the birth of the child and the mothers start smoking again. The existing information given to parents focuses only on smoking during pregnancy and not on smoking in presence of the young child. In a study among health workers in the Netherlands a majority stated that they did nothing or little about passive smoking in infancy, although a large majority did think it was their task to inform parents about the health effects of passive smoking. Two major impediments for paying attention to passive smoking were the lack of time and the lack of material.[12]

The objective of the present study was to achieve a better insight into the prevalence of passive smoking in infancy. Mothers were therefore asked about smoking habits at home and in the presence of the child. This study shows that, in 44% of households, children were exposed to one or two smokers. This percentage is also lower than the one found in the 1992 study (50%).[10]
Mothers smoked less often than their partner but, when they did, they smoked relatively more often at home than their partners. They also smoked more cigarettes at home than their partners. This difference may be explained by the fact that the mothers in the study had less frequently a full-time job than their partners and therefore spent more time at home (6% of the mothers had a full-time job, as opposed to 86% of their partners).
In the seven days before the respondents completed the questionnaire, 42% of the infants had been exposed to smoke in the living room. 8% of the babies had been exposed to tobacco smoke in the car and 4% had been exposed during feeding. These percentages of smoking in the car and during feeding were 12% and 9% respectively for the smoking group. The physical proximity of the child to the smoking source

during feeding and the high concentration of smoke in a car lead to an increased risk exposure. Feeding may be a time of relaxation for the mother or the parents what is associated with smoking a cigarette without realising the possible negative consequences for the child.
Passive smoking has been shown to be harmful to health. It can therefore be expected that exposure to tobacco smoke at a very young age contributes to an increased incidence of health problems immediately or later. The possible harm depends on the number of cigarettes smoked, the physical proximity of the smoking source, the size of the room, the ventilation and the size of the apartment. The literature does not state a threshold above which there will be harm to the child.

Practical Implications
The knowledge that passive smoking can have consequences to the health of children and the finding that infants are exposed to one or more smokers in 44% of the Dutch households lead to the recommendation that parents should be advised about the harmful effects of passive smoking for their child. Health workers, nurses, paediatricians and family physicians should inform parents systematically about health risks as a consequence of smoking habits and especially about smoking in the presence of the baby.
A recommendation is that material for parents and health workers should be developed to make it possible to inform parents systematically and efficiently on passive smoking. One aspect of the information should be that if parents are unwilling or unable to stop smoking, it is important to refrain from smoking in the presence of the child. Smoking during feeding and in the car should be discouraged.

Before being able to develop material for advising parents about the possible consequences of smoking in the presence of children, it is important to know more about the factors that influence smoking in the presence of the child. Why do parents smoke or allow smoking in the presence of the child? Are there some factors (attitudes, personal efficacy or subjective norm) that have a particular influence on this behaviour? An understanding of these factors will make it possible to provide effective information.
At the same time, information for health workers should be developed, so that they can improve their skills in giving advice to parents about passive smoking.

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CHAPTER 3

Need assessment for an education program on passive smoking

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ABSTRACT

Objective: Assessing the preconditions for the development of an education program to prevent passive smoking among infants in the Netherlands.

Method: In 1994, 66 managers of home-care associations were asked to participate in a study on the prevention of passive smoking in infancy. They were sent a short questionnaire about their activities for the prevention of passive smoking. Furthermore, they were asked to make a random selection of 12 persons from four groups of health professionals working in the well-baby clinics. The groups were physicians working in well-baby clinics, physicians working both in well-baby clinics and as family physicians, general nurses, and nurses working in well-baby clinics.

Results: 44 managers of home-care organisations participated in the study (response 67%). They gave the name and addresses of 526 health professionals: 413 completed the questionnaire (response 78%).

Both among the managers and among the child health professionals, a majority said that they did little about the systematic prevention of passive smoking in infancy. Eighty-seven percent of the child health professionals thought this was a job for the well-baby clinic and 95% wanted to devote attention to the issue. The child health professionals doubted their educational skills. Lack of time and educational material were perceived as barriers to education. Information in the 'groeiboek' (a booklet about child development and related issues given to parents by well-baby clinics) was thought to be good support for education, as were a video in the waiting room and information evenings for future parents.

Conclusions. Until now, activities for the prevention of passive smoking in infancy have been incidental, and associated in particular with children with airway symptoms. Materials and a plan for the development of a systematic education program are needed. Given the negative health effects of passive smoking, this should be done as soon as possible.

INTRODUCTION

Passive smoking can have harmful consequences for babies and young children. Children spend most of their young life in the presence of their parents. If the parents smoke, they will be exposed to tobacco smoke for long periods. In addition, the respiratory system of the young child is extra-sensitive because of its immaturity and its rapid development.[1] Children exposed to tobacco smoke seem to have a greater risk of a range of afflictions: they more often have otitis media, or wheezing, require adenotomy and tonsillectomy more often and run an increased risk of bronchiolitis during a Respiratory Syncytial Virus epidemic.[2] Respiratory symptoms are less frequent among older children. The reason may be that they come less into contact with tobacco smoke because they are more mobile as a result of, for example, school attendance.[2;3] There is also a statistical correlation between sudden infant death syndrome and passive smoking in infancy. This relation is dose-dependent; the risk increases as the environment smokes more.[4]

In general, mothers smoke less during pregnancy than before; some women even stop smoking entirely, but after delivery they often start again. This relapse is partly caused by the fact that women do not realise that passive smoking can be dangerous for the child, and partly by tension as a consequence of the excitement associated with the larger family.[5]

A Dutch study among 693 parents of children aged 0-14 months showed that 50% of the children were exposed to tobacco smoke at home: 42% of the children were exposed to smoking in the living room, 21% to smoking during feeding, and 11% in the car.[6]

Parental education is needed to reduce the prevalence of passive smoking in infancy. Well-baby clinics can play an important role here. Their frequent contacts with the target group – parents or caretakers – mean that well-baby clinics are logical places for the prevention of passive smoking.

To allow clinics to devote systematic attention to prevention, it is important to have an an instrument or method that fits in with the practice of preventive assistance. Data has therefore been collected about the preconditions and practicability of standardised systematic prevention of passive smoking at well-baby clinics.

The questions covered by this study were as follows:

1. To what extent does smoking prevention take place at well-baby clinics and what aids are used?
2. To what extent do physicians and nurses at well-baby clinics see smoking prevention as a task of the clinic?
3. What ideas do physicians and nurses have about the possibilities for well-baby clinics to prevent smoking?
4. Which health professionals should concentrate on smoking prevention?
5. What barriers exist for providing smoking education?
6. What are the main instruments for behaviour intervention that physicians and nurses at well-baby clinics consider adequate?

METHOD

As the majority of standardised prevention programs for children aged 0 to 4 years old are given by the well-baby clinics, a short questionnaire was sent to the managers of these organisations. The questionnaire included questions on the policy of the organisation towards passive smoking in infancy. Furthermore, a questionnaire was distributed among an a-select sample of health professionals working in the clinics. The questionnaire consisted of questions about which smoking prevention activities already exist in the well-baby clinic, knowledge about the effects of passive smoking, whether it is the task of the well-baby clinics to engage in smoking prevention, opinions about influencing the smoking behaviour of parents, which persons at the clinic should implement the program, what the obstacles are to provide education about passive smoking and which instruments are necessary to implement the program. Furthermore, the questionnaire contained questions about smoking behaviour, age, work experience, and the education of the health professionals.

All 66 home-care organisations in the Netherlands were asked to participate and to make a random selection of 12 names and addresses of health professionals working in the well-baby clinics.

In order to check for possible differences between health professionals, the managers of the home-care organisation were asked to select them from four groups: general nurses, specialised parent and childcare nurses, physicians working in well-baby clinics, and physicians working in well-baby clinics who also work as family physicians. To guarantee the a-selectivity of the chosen health professionals, instructions were sent with the participation letter.

To analyse the data, we used frequencies and the Chi-square test. A difference was considered to be significant when p was <0.05.

RESULTS

All 66 organisations for home-care were asked to take part in the study and 44 responded positively.

Most of the non-participating associations said they were too busy, a few said they did little about smoking prevention and that they had no interest in the study.

At the well-baby clinics, there were not always enough general nurses or family physicians present. In these cases, child health nurses and child health physicians were selected. This is the reason why the distribution of the four groups is uneven. The 44 participating home-care organisations gave the names and addresses of 526 health professionals. Seventy-eight percent (413 persons) returned the questionnaire.

The response of the child health physicians and of the child health nurses was considerably higher than the response of the other two groups of health professionals (Table 1).

Table 1: Response according to the different health professionals.

	Child health physician	Child health/ family physician	General nurse	Child health nurse	Total
Approached	155	107	44	220	526
Response	120	65	28	199	413
% response	77	61	64	90	78

Of the home-care organisations that responded, 73% said they hardly had any, or no, systematic policy for the prevention of passive smoking in infancy.
Sixty-two percent of the child health professionals stated that prevention of passive smoking was not a part of their policy (Table 2).

Table 2: Percentage of child health professionals that engaged in activities on passive smoking, that wanted to pay attention to it, and that had educational skills, broken down according to category of child health professional.

		Child health physician	Child health/ family physician	General nurse	Child health nurse
Is prevention of passive smoking a part of the policy of the well-baby clinic? (n=412)	Yes	20%	12%	11%	18%
	No	59%	63%	71%	62%
	Do not know	21%	25%	18%	20%
Do you think giving education about passive smoking is a task of the well-baby clinic? (n=413)	Yes	77%	66%	64%	86%
	No	3%	15%	4%	0%
	No opinion	4%	8%	11%	2%
	Other	16%	11%	21%	12%
Do you want to pay attention to passive smoking in infancy? (n=413)	Yes	96%	84%	96%	98%
	No	4%	16%	4%	2%
Do you think you yourself are able to provide education on passive smoking? (n=413)	Yes	39%	49%	18%	29%
	More or less	52%	45%	46%	54%
	No	9%	6%	36%	17%

Fifty-five percent of the respondents said that they knew about the consequences of passive smoking, 41% knew more or less what they were and 4% said they were not familiar with the effects of passive smoking on young children.
According to 75% of the child health professionals, prevention of passive smoking should be started by midwives and family physicians. A few thought it was primarily a task for the well-baby clinic to give the information when the child had respiratory problems.
House visits are, according to 91% of the respondents, a good opportunity to provide the education, although fifty-five percent thought that the health professional should be able to decide whether to do so or not.
Seventy-three percent thought they would be able to change health behaviour. However, when smoking behaviour was involved, only 56% thought they could change it. Eighty-two percent of the health professionals did not smoke, 9% smoked less than five cigarettes a day, 7% smoked five to 15 cigarettes a day and 2% smoked 15 cigarettes or more.

After dividing the respondents into smokers and non-smokers, smoking prevalence was compared in the four groups of health professionals working in the well-baby clinics. Family physicians and general nurses smoked significantly more often than nurses and physicians working in well-baby clinics (x^2=15.22, p=0.0016).
Being a smoker or non-smoker was not important for the attention that the health professionals wanted to give to passive smoking in infancy. It was also not important for their perceived ability to change smoking behaviour. A large majority of the respondents thought that the nurses and physicians were the ones that should pay attention to the prevention of passive smoking, rather than other staff working at the well-baby clinics (Table 3).

Table 3: Number and percentage broken down according to who should pay attention to the prevention of passive smoking in infancy (several answers possible)

Kind of professional	N	%
Nurse	352	85
Physician	281	68
Assistant	12	3
No preference	37	9
No opinion	10	2

When the nurses or physicians thought they were skilled in providing education about passive smoking, the skills were mostly learnt by reading professional literature and through training in communication techniques. When they thought they were not skilled, then they thought they could acquire the skills by reading professional literature and by following training in behaviour change.
Possible problems relating to education about passive smoking were lack of time (61%), lack of written education material (51%) and lack of the right assistance relating to behaviour change (25%).
Sixty-five percent thought that the 'groeiboek' (a booklet about child development and related issues given to parents by well-baby clinics) was a good forum for behaviour intervention; only 5% did not think this was a good idea. According to the health professionals, the 'groeiboek' is well read by the parents. The respondents were more negative about some kind of passive smoking card (not a good idea: 25%). The argument was that parents already receive so many leaflets and information. This same argument was used for a booklet (not a good idea: 20%). The response to the poster was more positive (not a good idea: 7%): the respondents thought that this intervention method made parents aware of the problem without being too intrusive. An argument against was that there are already so many posters or that a poster is too non-committal.
In addition to these education methods, a number of health professionals also mentioned a video presentation or an information evening as good methods for behaviour intervention (Table 4).

Table 4: Opinions about different forms of education about passive smoking in infancy: n=413

	Good idea	Not a good idea	No opinion	unknown
Passive smoking card	55%	25%	12%	8%
Information in 'groeiboek'	65%	5%	1%	29%
Leaflets	61%	20%	8%	10%
Posters	56%	7%	5%	32%

CONCLUSIONS

The response among the home-care organisations was 67%. The responding organisations were asked to give the names and addresses of 12 health professionals. During the selection of the four groups of health professionals, there were not enough general nurses and family physicians, and this led to four groups of varying size. Child health nurses and child health physicians were then randomly selected. The response from the child health physicians and child health nurses was considerably higher than the response from the other two groups. A possible explanation may be that this group is more committed and that it specialises in child health.

The total response was 78%. This corresponds to other cross-sectional studies on passive smoking.[6] The fact that there are no data about the non-response group means that some kind of bias cannot be excluded. It is possible that the non-responders included more smokers and organisations with no activities for smoking prevention: in that case, the results present a more positive picture.

The study shows that a majority of the home-care organisations and of the child health professionals do not engage in the prevention of passive smoking in infancy. When something is done in this area, it is mostly on an incidental basis and mainly when the child has respiratory problems. Improvement is required here since passive smoking in infancy can lead to several health problems. It is too late to start education after symptoms occur. A reason for this lack of systematic prevention may be that child health professionals are insufficiently aware of the negative effects of passive smoking and therefore do not see the importance of good education for the parents of the child. On the other hand, the child health professionals perceive the prevention of passive smoking in infancy as one of the tasks of the well-baby clinic and a majority wants to devote attention to the prevention of passive smoking.

The family physicians and the general nurses smoked significantly more often than the child health nurses and the child health physicians. Being a smoker or non-smoker had no effect on the attention the respondents wanted to pay to the prevention of passive smoking: this does not bear out the hypothesis that smokers are less inclined to change the smoking behaviour of others. A possible reason for this result may be that the study deals with health professionals and their task is to inform others about what is healthy and unhealthy. There is, of course, a possibility of social desirable answers; "people expect me to pay attention to smoking so it is better if I say that I want to pay attention

to it". Being a smoker or non-smoker was also unimportant for the perceived self-efficacy in changing the smoking behaviour of parents.
We can conclude that, in general, the family physicians have a less positive attitude towards giving education on passive smoking than the other three groups of health professionals.

The perceived self-efficacy in changing smoking behaviour is considerably lower than in changing unhealthy behaviour in general. This difference may be explained by the fact that child health professionals are aware of the addictive character of smoking and stopping smoking often involves major psychological pressure for the person in question. This makes it difficult to bring about a behaviour change when smoking is involved.
The house visit is a good opportunity for education. However, child health professionals want to retain the freedom to decide when they provide education about passive smoking. It is also important for midwives and family physicians to start prevention activities during pregnancy. In the home-care organisations, there was a preference for education on passive smoking from nurses and physicians rather than assistants. They agreed that professionals should provide the education. The general preference for nurses is probably based on the fact that they usually pay the house visit. The nurses therefore have a more personal contact with the parents and their environment than the physicians and they are therefore more suitable for education purposes.
The child health professionals have doubts about their education skills with respect to passive smoking. They say that these skills can mainly be learnt by reading professional literature and by following training in behaviour change. In addition to skills, a few other factors constitute obstacles to education on passive smoking. In particular, the lack of time, education materials and support play an important role. It is important for good educational material to be available and for the intervention not to be too time-consuming. Education materials thought to be suitable are information in the 'groeiboek' and a poster: the 'groeiboek' is well read by the parents and a poster is not too intrusive. The health professionals themselves mention a video presentation in the waiting room or an information evening for future parents as possibilities for intervention.

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CHAPTER 4

Factors that influence passive smoking among children

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ABSTRACT

Background. The aim of the study was to assess the factors that influence smoking in the presence of the infant by mothers, partners, other family members and friends.

Methods. An observational study using questionnaires was performed with smoking and non-smoking parents of babies between one and 14 months old attending Dutch well-baby clinics between February and May 1996.

The main measures were prevention of passive smoking in children by mothers and the relation with self-reported attitudes, social influence and self-efficacy.

Results. A total of 1702 parents completed the questionnaire (63%). A total of 1551 questionnaires were completed by the mother. Sixty-five percent of the mothers prevented passive smoking by their child. This figure was 55% for smokers and 69% for non-smokers. Attitude was the factor that most explained preventive behaviour among both smokers and non-smokers. Among the respondents, a lack of prevention of passive smoking was significantly related to (1) a negative attitude, and to (2) a negative social influence exerted by their partner, (3) lower self-efficacy in reducing passive smoking and (4) increasing age of the child. (5) Finally, a lack of prevention is associated with the mother's self-efficacy in asking others not to smoke. This association strongly differs between smoking and non-smoking mothers.

Conclusion. The results suggest that health education efforts should focus on attitude and self-efficacy, assuming that these precede actual behaviour, and in particular on the health consequences of the exposure of young children to tobacco smoke. The information should not be restricted to parents of newborn babies; it should also focus on parents with older children. Particular attention should be paid to smokers with a low educational level. The results also indicate that education should strengthen the ability of non-smoking parents to deal with smokers and the ability of smoking parents to deal with their own smoking behaviour.

INTRODUCTION

Passive smoking can have harmful consequences for babies and young children. Children spend most of their life in the presence of their parents. If parents smoke, the children will be exposed to tobacco smoke for long periods.[1] Children who are exposed are at risk of a range of health problems: they are more likely to have otitis media or wheezing, adenotomies, tonsillectomies and, during a Respiratory Syncytial Virus epidemic, to contract bronchiolitis.[2-6] There is also a relationship between sudden infant death and passive smoking in infancy. This correlation is dose-dependent.[6-8]

Mothers smoke less during pregnancy than they used to. Some women actually stop smoking during pregnancy, but after delivery they often relapse into their previous smoking habits. This relapse is partly caused by the fact that women do not realise that passive smoking can be dangerous for the child.[9] A Dutch study conducted in 1992 indicates that in 42% of the households, people smoked in the presence of the child in the living room and that, in 12% of households, people smoked in the car in the presence of the child. That study concluded that parental education would be needed to reduce passive smoking in infancy.[10]

To support the systematic prevention of passive smoking in children, an instrument or method is needed which fits in with existing preventive practice. A better understanding of the factors that influence smoking in the presence of the child is needed. Until now, little research has been conducted into the background of parental smoking and/or parents allowing others to smoke in the presence of their baby. It is known that babies are at greater risk if the mother smokes than if the father smokes. It also known that younger mothers with a high socio-economic status smoke less in the presence of the baby.[11] Less is known about factors such as attitudes, social values and self-efficacy relating to the prevention of passive smoking in infancy. At present, Strecher's study is the only one that has paid attention to self-efficacy and the expectations of mothers about smoking in the presence of the child.[12] This American study points out that mothers lack confidence in their ability to ask partner, family and friends to refrain from smoking around the child. Women who lived in small homes or trailers thought that it would be difficult to maintain a smoke-free environment during winter months when spending more time indoors.

Dutch thinking about smoking differs from the American approach and so different factors may have an effect on the prevention of exposure to tobacco smoke. The objective of the present study was to determine the behavioural factors that influence smoking in the presence of the baby in the Netherlands. Non-smokers are just as interesting as smokers; the former may also have contacts with smokers. It is not that unrealistic to assume that the smoking behaviours of smokers and non-smokers are influenced by different factors in the presence of a child. This study therefore looks at both groups separately.

An integrated behavioural model was used to study this objective. This model is based on the health belief model: Fishbein and Ajzen's planned behaviour theory and Bandura's self-efficacy concept.[13, 14] According to this model, the main concepts that explain behaviour are attitudes, social influence, self-efficacy and intention. The results

of this study are meant to contribute to the development of educational material for parents and social workers.

METHOD

Study population and data collection

The study population consisted of parents of infants aged 1 to 14 months who had attended a well-baby clinic between February and May 1996. In the Netherlands, well-baby clinics are run by home-care associations and they are attended by 98% of all infants.[19] Sixteen home-care organisations were asked to participate in the study, one from each of the four major cities of the Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht) and one from each Dutch province. Eventually, 14 organisations participated: 4 from the major cities and 10 provincial associations. Each organisation was asked to make a random selection of five well-baby clinics according to a specific procedure. Each of these clinics issued a questionnaire to the first 40 parents with a baby aged 1 to 14 months who visited the well-baby clinic and agreed to take part in the study - both smoking and non-smoking parents. Parents were excluded when they could not read or write Dutch. The well-baby clinics were asked to write down the number of parents who refused to participate in this study and the smoking status of these parents.

The written information accompanying each questionnaire assured parents of anonymity and confidentiality. Their names were not requested. The parents were asked to complete the questionnaire at home and return it in a stamped addressed envelope. The study was approved by the Medical Ethics Committee.

The questionnaire and data

The questionnaire was developed using an integrated behavioural model.[13,14] This model looks at people's attitudes, social influence and self-efficacy. All questions were rated using a five-point Likert-type scale.

The term 'attitudes' refers to personal attitudes towards acting in a certain way.[15] The questionnaire contained a total of six attitude questions, like "I find it important to prevent passive smoking by my child because of the health consequences". The answer categories ranked from "I totally agree" to "I totally disagree". The attitudes were highly correlated and they could be treated as one factor (Cronbach's alpha 0.77). The scores on this factor were reduced to three categories (tertiles) for modelling: negative attitude, neutral attitude, and positive attitude: it seemed important to distinguish between the average category and the negative and positive categories.

'Social influence' relates to the feelings of important others, as perceived by the respondent, about certain types of respondent behaviour.[15] The questionnaire contained nine questions about how important, annoying or over-the-top partners, family or friends found it that the respondent did not allow smoking in the presence of the child for health reasons: these questions are called the normative beliefs. They were scored from –2 (negative towards the preventive behaviour) to +2 (positive towards the preventive behaviour). The questionnaire also contained three questions about how important the opinions of these three groups were for the respondent: the motivation to

comply with the normative beliefs. The answer categories ranged from "I totally disagree" to "I totally agree" (the score ranged from 1 to 5). In the analysis, for each person rated, the normative belief variable was multiplied by the motivation of the mother to comply with it. This resulted in nine variables with a score from –10 to +10: -10 meant that the person rated did not find it important that the respondent prevented passive smoking for health reasons and it meant also that the opinion of this person was important. Principal component analysis yielded two components: one for the social influence of the partner (Cronbach's alpha 0.49) and one for the social influence of friends and family (Cronbach's alpha 0.75). The scale for friends and family was reduced to three categories for modelling (tertiles); negative influence, no or little influence, and positive influence. The scale for the partner was reduced to three categories according to the smoking status of the partner; it was assumed that the mothers with non-smoking partners are influenced in a different way to the mothers with a smoking partner. The three categories for the influence of the partner were the following: positive influence of smoking partner, negative influence of smoking partner and partner does not smoke.

'Self-efficacy' is a person's confidence about behaving in a particular way.[15] Seven questions about self-efficacy were included in the questionnaire, like "I find it difficult to prevent passive smoking by my child when I have visitors who smoke". Principal component analysis presented two components: one measuring general self-efficacy to prevent passive smoking in infancy (Cronbach's alpha 0.77) and one to measure a more practical form of self-efficacy, namely asking others not to smoke in the presence of the child (Cronbach's alpha 0.67). The self-efficacy scales were reduced to three categories representing low, average and high levels of self-efficacy (tertiles).

Behaviour relates to the person's actual behaviour. Behaviour was measured by one question: "Do you always try to prevent smoking around your child?" The answers ranged from 'always' to 'never'. The answers were compressed into two categories for modelling. The first category represented mothers who do try to prevent passive smoking (always and often) and the second category mothers who do not try to prevent passive smoking (sometimes, seldom and never).

Normally, the intention to behave in a certain way is also a part of this behavioural model. In this study, this aspect of the model was not included since the main objective was to determine the factors that influence the behaviour and not the intention.

In addition to the behavioural factors, demographic characteristics were measured: the age of the child (in months), the age of mother and father (in years), the number of children in a family (one, two, three or more), and the educational level of mother and father (low, average, high). A low level concerned the people who had not finished secondary education or had only received lower education. The average level concerned the people who had finished average or higher secondary education and the high level included those with a masters or bachelor degree.

Statistical analysis

We first assessed the demographic and socio-economic characteristics of the respondents as well as the occurrence of smoking and the preventive behaviour of

mothers with respect to passive smoking by their child. Second, we looked at differences in attitude, social influence and self-efficacy between mothers who prevented and did not prevent passive smoking. We broke this analysis down according to maternal smoking status, as we expected this to be of major importance. Finally, we assessed the association between preventive behaviour and both background characteristics and attitude, social influence and self-efficacy, both crude and mutually adjusted. For the latter purpose, we used a multiple logistic regression with stepwise forward selection. We conducted this analysis for the total group of mothers. Next, we assessed whether the adjusted model differed for the smoking and non-smoking mothers by including interaction terms of maternal smoking with the characteristics in the final model. Finally, we repeated the regression analyses for the smoking and the non-smoking mothers separately. A difference was considered to be statistically significant when $p<0.05$.

RESULTS

Three well-baby clinics did not distribute all 40 questionnaires and 18 parents refused to participate: 12 parents smoked and 6 did not. A total of 2720 parents agreed to participate and to complete the questionnaire. Of these, 1702 (63%) returned the questionnaire. Most of the questionnaires were completed by the mother (n=1551, 91%). The results in this article relate only to these 1551 questionnaires in order to avoid information bias as a result of differences in respondent characteristics. The average age of the children was 6 months. The average age of the mothers was 31 and the average age of their partners was 33. The average age of the mothers was slightly higher than the average age of mothers with newborn children in the Netherlands.[16] The educational level of sixty-one percent of the mothers was average or high. This is slightly higher than the overall distribution of the educational level for women in the Netherlands.[17] Details regarding characteristics of respondents have been reported elsewhere.[8]

Smoking

A total of 24% of the mothers and 33% of the partners smoked. A total of 44% of the babies were exposed to one or more smokers in the family. Thirty-nine percent of the mothers and/or the partners smoked at home. Forty-two percent of the babies had been exposed to tobacco smoke in the 7 days before the questionnaire was completed, 8% to tobacco smoke in the car and 4% during feeding.

Preventive Behaviour

A majority of the mothers stated that they often or always prevented the exposure of their child to tobacco smoke (65%). Fifty-five percent of the smokers prevented exposure; this figure was 69% for the non-smokers. There were significant differences between the mothers who did not smoke or who smoked fewer than five cigarettes a day and those who smoked five cigarettes or more a day (figure 1). The mothers who smoked five cigarettes or more stated less frequently that they prevented passive smoking ($\chi^2= 39.79$; $p= 0.000$).

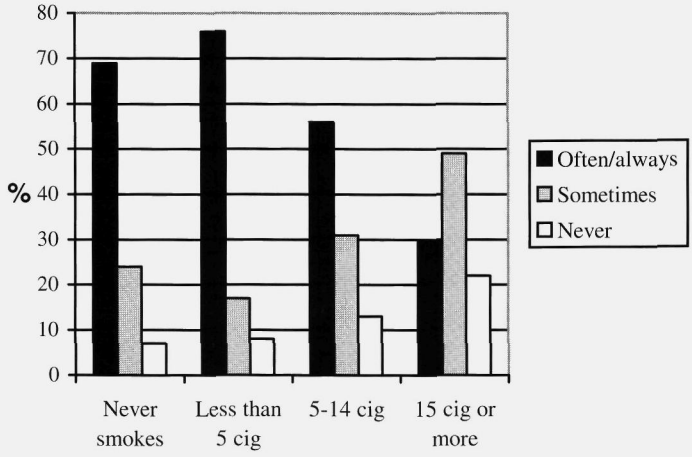

Figure 1: The prevention of passive smoking in infants, broken down according to the number of cigarettes smoked a day by the mother

Attitudes

The mothers who never prevented passive smoking had a more negative attitude than the mothers who always or often tried to prevent passive smoking (Table 1). For example, 90% of the mothers who prevented the exposure of their child to tobacco smoke thought that it was important to limit it because of the health of the child while 31% of the mothers who never and 59% mothers who sometimes prevented it thought this. The mothers whose behaviour was preventive differed significantly from the mothers who took no preventive action for all questions in both the smoker and non-smoker groups. The smoking mothers more often had a negative attitude than the non-smoking mothers: forty-five percent of the smokers versus 25% of the non-smokers (χ^2=61.87, p=0.000).

Social influence

The opinion of the partner about passive smoking was important for most of the mothers (non-smokers: 93%; smokers: 88%), followed by the opinion of family (non-smokers and smokers: 61%), and the opinion of friends (non-smokers: 48%, smokers: 44%).

Both smokers and non-smokers allowed passive smoking more frequently when their partner or family and friends were less supportive (Table 1). The negative influence of a partner and a lack of preventive behaviour were more closely related than the negative influence of friends and family, and reduced prevention. Approximately 46% of the non-smoking mothers with a smoking partner and 48% of the smoking mothers with a smoking partner expected a negative influence from their partner regarding the prevention of passive smoking (χ^2=0.16, p=0.687).

Self-efficacy

In general, the mothers found it more difficult to ask family or friends (respectively 31 and 35%) not to smoke in presence of the infant than to ask their partners (9%). The analysis also pointed out that non-smokers had more problems in asking others not to smoke in presence of the child than smokers but the latter group had more difficulties in reducing passive smoking in general. Twenty-five percent of the non-smokers had a high self-efficacy in asking others not to smoke in presence of the child versus 48% of the smokers (χ^2=70.71, p=0.000).

The smokers and non-smokers who did not prevent passive smoking differed significantly in terms of self-efficacy scores for reducing passive smoking and asking others not to smoke. As assumed beforehand, mothers who fail to prevent passive smoking have a lower self-efficacy score (Table 1 and Figure 2).

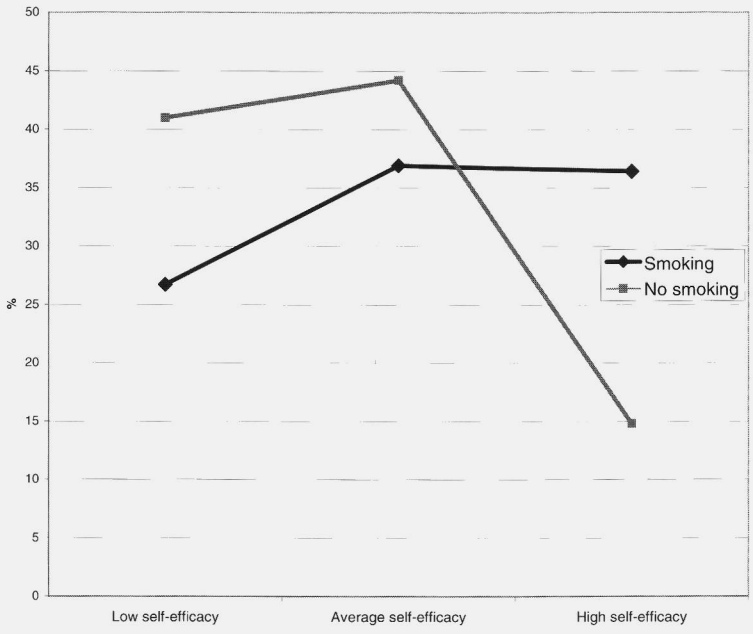

Figure 2: Self-efficacy in asking others to refrain from smoking in presence of the child among mothers with no preventive behaviour broken down according to the smoking state of the mother

Regression analysis

Multiple logistic regression analyses were conducted to identify the significant characteristics and to determine the relative importance of the various characteristics regarding actual maternal behaviour in terms of preventing passive smoking in infancy. In Table 1, we present the associations of all separate characteristics with preventive behaviour of the mothers. In the unadjusted model almost all factors were significantly related to the preventive behaviour of the mother. Exceptions were age of the mother and of the father.

After mutual adjustment, five of these characteristics were found to be associated with preventive behaviour (Table 2). A lack of preventive behaviour was associated with a negative attitude, a negative influence of a smoking partner, a lower level of self-efficacy in reducing passive smoking, a lower efficacy in asking others to refrain from smoking in presence of the child and an older age of the child. Smoking behaviour of the mother did not contribute to the adjusted model, as it appeared to be highly collinear with attitudes. However, the interaction between smoking and self-efficacy in asking others to refrain from smoking in presence of the child contributed to the model with statistical significance, showing that its association with preventive behaviour differs by smoking status. In Table 2, we therefore only present an adjusted model in which this interaction is included. The likeliness of preventive behaviour especially differed for mothers with low and high self-efficacy, as was already indicated by the unadjusted results as presented in Figure 2.

DISCUSSION

We examined the association of various aspects of the behavioural model and of social and demographic characteristics with the actual prevention of smoking around the child. Our results show this preventive behaviour to be strongly associated with attitudes, social norms of the partner and self-efficacy in reducing passive smoking. Furthermore, this behaviour is less likely when the infant grows older. Finally, it is associated with the mother's self-efficacy in asking others not to smoke but this association strongly differs between smoking and non-smoking mothers.

The response in this study was 63%, which is lower than in other studies. Little is known about the non-response group. Bias in the results therefore cannot be completely excluded. On average, the mothers in this study were significantly older than the mothers of newborn babies in the Netherlands.[16] The educational level was higher than the average educational level of women in the Netherlands.[17] Another Dutch study shows that older and more highly educated women smoke less frequently.[18] This could mean that the results of the present study underestimate the true smoking prevalence. The prevalence of smoking among the mothers (24%) was indeed lower than that found in the study conducted in 1992 in one province of the Netherlands (28%).[10] Although this difference is not extremely large, a bias might have resulted from smoker non-participation. To deal with this potential bias, the analyses in this study were conducted separately for mothers who smoked and mothers who did

not smoke. It is not likely that selection influenced the relation between preventive behaviour and the different items.

Table 1: Characteristics of respondents: proportion of smoking mothers by category and association with a lack of prevention of passive smoking among mothers (unadjusted).

	N@	% smokers ^	OR #	P-value &
Educational level of the mother		*		0.000
Low	126	39%	2.83 (2.02 to 3.96)	
Average	455	26%	2.05 (1.55 to 2.71)	
High $	314	14%	1	
Educational level of the father		*		0.000
Low	271	32%	2.40 (1.76 to 3.27)	
Average	521	26%	1.83 (1.39 tot 2.41)	
High $	393	16%	1	
Age of the mother		*		0.872
Younger than 25	59	38%	0.93 (0.60 to 1.46)	
25 to 30	360	27%	0.99 (0.77 to 1.26)	
30 to 35 $	570	23%	1	
35 or older	196	21%	0.88 (0.65 to 1.20)	
Age of the father				0.451
Younger than 30	218	29%	0.96 (0.72 to 1.30)	
30 to 35 $	561	24%	1	
35 to 40	301	21%	1.10 (0.85 to 1.43)	
40 or older	105	24%	0.78 (0.52 to 1.17)	
Age of the child				0.000
0 to 3 months $	256	25%	1	
3 to 6 months	378	22%	1.36 (0.99 to 1.87)	
6 to 9 months	218	26%	1.80 (1.27 to 2.55)	
9 to 12 months	184	28%	1.91 (1.34 to 2.73)	
12 months or older	149	25%	2.47 (1.69 to 3.61)	
Number of children				0.011
1 child $	575	25%	0.64 (0.48 to 0.86)	
2 children	422	25%	0.79 (0.58 to 1.08)	
3 children or more	188	23%	1	
Smoking of the mother				
No	895	n.a.	0.55 (0.43-0.69)	0.000
Yes	371	n.a.	1	
Attitude		*		0.000
Negative	335	37%	31.34 (21.66 to 45.35)	
Neutral	402	23%	4.23 (2.95 to 6.04)	
Positive $	448	16%	1	
Social influence of partner		*		0.000
Negative influence	185	47%	3.20 (2.37 to 4.32)	
Positive influence	207	45%	0.58 (0.42 to 0.81)	
Non-smoking partner $	793	15%	1	
Social influence of family and friends				0.000
Negative influence	398	24%	2.81 (2.13 to 3.71)	

	N@	% smokers ^	OR #	P-value &
No or little influence	409	23%	1.82 (1.37 to 2.40)	
Positive influence $	378	27%		
Self-efficacy in reducing passive smoking				0.000
Low	446	27%	8.80 (6.20 to 12.49)	
Average	392	24%	5.49 (3.85 to 7.85)	
High $	347	23%	1	
Self-efficacy in asking others not to smoke		*		0.000
Low	347	19%	2.64 (1.98 to 3.51)	
Average	488	18%	1.63 (1.25 to 2.14)	
High $	350	39%	1	

@ Numbers do not add up to 1551 due to missing values
& P value for inclusion of the characteristic in the logistic model
$ Reference category
# OR= odds ratio, 95% confidence interval
^ Percentage of smoking mothers in each category; * indicates that differences in these percentages across categories are statistically significant ($p < 0.05$).
Note n.a.: not applicable

Behaviour

A majority of the mothers indicated that they tried to reduce smoking in the presence of their children (65%). Even mothers who smoked five cigarettes a day or more stated that they prevented smoking in the presence of their child, but less frequently than non-smoking mothers or than mothers who smoked fewer than five cigarettes a day. In the 7 days before completing the questionnaire, there had been smoking in the presence of the children in 42% of households. In this respect, there seemed to be a discrepancy between what some mothers said they did about passive smoking and their actual (self-reported) behaviour. A possible explanation for this discrepancy is that the women may have been giving the answers that they assumed to be the most acceptable. Another explanation for this difference could be that the mothers genuinely did not know the extent to which their children were exposed to tobacco smoke.

Attitudes

Women who tried to limit exposure to tobacco smoke found, in particular, that it was more important for the health of the child. Women who did little about passive smoking by their child either seemed to be less aware of the possible health consequences of passive smoking or underestimated them, and therefore did not find it important to prevent it.

The attitude of the mother regarding the avoidance of passive smoking was the most important predictor of the difference in preventive behaviour among both smokers and non-smokers and attitude was also highly correlated with smoking of the mothers. A negative attitude about the prevention of passive smoking was more likely among the smokers than the non-smokers, however. This means that information directed at parents should not forget to emphasise attitudes and, in particular, health aspects of smoking in the presence of children; especially among the smokers.

Table 2: Characteristics significantly associated with a lack of prevention of passive smoking (adjusted).

	N*	Adjusted OR #	P-value &
Age of the child			0.001
0 to 3 months $	256	1	
3 to 6 months	378	1.11 (0.70 to 1.76)	
6 to 9 months	218	1.41 (0.84 to 2.36)	
9 to 12 months	184	1.94 (1.14 to 3.28)	
12 months or older	149	2.91 (1.66 to 5.08)	
Attitude			
Negative	335	26.11 (16.60 to 41.05)	0.000
Neutral	402	3.52 (2.30 to 5.39)	
Positive $	448		
Social influence of partner			
Negative influence	185	2.80 (1.79 to 4.38)	0.000
Positive influence	207	1.06 (0.64 to 1.73)	
Non-smoking partner $	793	1	
Self-efficacy in reducing passive smoking			
Low	446	4.66 (2.81 to 7.73)	0.001
Average	392	3.25 (1.99 to 5.31)	
High $	347	1	
Self-efficacy in asking others not to smoke by maternal smoking			0.010 @
Low and no smoker	287	1.71 (0.91 to 3.22)	
Average and no smoker	396	1.21 (0.68 to 2.17)	
High and no smoker	212	0.59 (0.30 to 1.15)	
Low and smoker	60	0.82 (0.36 to 1.90)	
Average and smoker	92	1.37 (0.68 to 2.79)	
High and smoker $	138	1	

* Numbers do not add up to 1551 due to missing values
& P value for inclusion of the characteristic in the logistic model including all other characteristics mentioned
$ Reference category
# OR= odds ratio, 95% confidence interval
@ The p-values for inclusion of maternal smoking status and self-efficacy to the adjusted model were 0.911 and 001; the p-value for subsequent inclusion of their interactions was 0.000.

Subjective norm

The opinion of partners about preventing passive smoking was most important regarding the actual preventive behaviour of mothers. The views of friends and family about this topic seemed to matter less. An explanation may be that the partner is more closely related to the mother than friends and family. It is noteworthy that, after adjustment for the other factors, the positive influence of a smoking partner was still important in terms of the preventive behaviour of mothers: mothers who are positively influenced by a smoking partner prevented passive smoking even more than those with

non-smoking partners. This suggests that, in households with a smoking partner, it is important for both parents to be informed about the risks of passive smoking.

Self-efficacy

The mothers seemed to have more problems in asking family and friends to refrain from smoking than in asking their partner. This is in contrast with the results of Strecher's study, in which it is claimed that mothers have difficulties with asking others not to smoke, especially smoking partners.[12]

The regression analysis showed that the non-smokers were more preventive when they had the skills to reduce passive smoking in infancy in general and to ask others not to smoke. Among smokers, only the ability to reduce passive smoking in general was important: prevention did not differ according to the ability to deal with the social environment. It would appear that smokers are confronted more with their own behaviour and attitudes when they want to prevent passive smoking, while non-smokers are also confronted with other people's behaviour and attitudes.

In our unadjusted analysis, mothers with a lower educational level prevented passive smoking less often. This corresponds with Jarvis' results in which it was found that mothers with a higher socio-economic status smoked less in the presence of the child.[11] However, in our study this association becomes much weaker and does not contribute to the adjusted model with statistical significance. The same holds for its interaction with maternal smoking status.

The present study consisted of a cross-sectional sample, so it cannot be concluded that the factors caused the preventive behaviour. Its results only show that differences exist between the preventive and non-preventive group. The results may reflect the impact of passive smoking behaviour on attitude or self-efficacy instead of the impact of attitudes and self-efficacy on passive smoking. Longitudinal research is needed to assess whether changes in attitudes, social influence and self-efficacy indeed lead to a change in this preventive behaviour.

IMPLICATIONS

If we assume that indeed a change in attitude and self-efficacy leads to a change in preventive behaviour, the results of our study may have consequences for at least the targeting of education messages to specific groups in a prevention program. First the consequences of passive smoking must be emphasised, while it seems that the more mothers are aware of the possible risks and have positive attitudes, the more they will try to prevent the exposure of their child to tobacco smoke. In addition, parents must be aware of other factors that determine the exposure of their child to tobacco smoke. For example, exposure is much higher when people smoke in a confined space in the presence of the child than when they smoke in a room where the child almost never comes. The information should not only be restricted to parents of newborn babies but should also focus on parents with babies older than a few months. Assuming changes in self-efficacy to lead to behavioural change, parents, especially the non-smokers, should be learned some skills for dealing with difficult situations such as how to ask

their family and partner to refrain from smoking in the presence of the child. In particular, the lack of skills for dealing with these situations makes it difficult to prevent passive smoking at all times. Last but not least, particular attention must be paid to households with one or two parents who smoke. In these households, a more significant change in behaviour is required than in non-smoking households. Education in this group should therefore focus on attitudes and on measures to prevent smoking in the vicinity of their child.

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CHAPTER 5

The development and evaluation of an education program on passive smoking among children.

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ABSTRACT

Background. Passive smoking is harmful to young children. A protocol has been developed to allow health care workers to communicate with parents about preventing passive smoking. The main message was to refrain from smoking in the presence of the child. The aim of the study was to assess the effectiveness of this education program.

Method. The prevalence of smoking in the presence of infants aged 0–10 months was compared before and after the implementation of the education program. National samples of mothers completed questionnaires in 1996 (n=1,129) and in 1999 (n=2,534). Questions were asked about smoking in the living room in the presence of infants, and about parental smoking, and background characteristics.

Results: The prevalence of passive infant smoking decreased from 41% to 18%. The adjusted odds ratio for passive infant smoking in 1999 compared to 1996 was 0.34 (0.26–0.43) when none of the parents smoked, 0.19 (0.14–0.27) when one of the parents smoked, and 0.30 (0.20–0.44) when both parents smoked.

Conclusion. The implementation of this health education program seems to have been very successful in reducing passive smoking in children. Implementation of similar health education programs in other countries is recommended.

Passive smoking can have harmful consequences for babies and young children. Children spend most of their time in the presence of their parents. If parents smoke, the children will be exposed to tobacco smoke for long periods.[1] Children who are exposed are at risk of a range of health problems: they are more likely to have otitis media or wheezing, adenotomies, tonsillectomies and, during a Respiratory Syncytial Virus epidemic, to contract bronchiolitis.[1–6] There is also a dose-dependent relationship between sudden infant death and passive smoking.[7, 8] Furthermore, passive smoking is associated with excessive infant crying.[9, 10]
Mothers often smoke less during pregnancy than they used to. Some women actually stop smoking during pregnancy, but after delivery they relapse into their previous smoking habits.[11] This relapse is partly caused by the fact that women do not realise that passive smoking can be dangerous for the child.[11] A Dutch study conducted in 1992 indicates that in 42% of households, people smoked in the presence of the child in the living room and that, in 12% of households, people smoked in the car in the presence of the child.[12] Data about the prevalence of passive smoking in other western European countries are sparse. Only in northern European countries has the prevalence of passive smoking in childhood been studied more intensively: a study among parents of children born in 1992 in Finland, Sweden, Norway, Finland, Iceland and Denmark showed that the prevalence of passive smoking is respectively 7%, 15%, 32%, 46% and 47%.[13] A European project on smoking cessation in pregnancy (Euro-scip) showed that about 50% of all new-borns and young children in Germany and Ireland grow up in a household where at least one person smokes. Only in Sweden is this proportion much lower in families with young children, with only 10% of mothers and 12% of fathers smoking.[14, 15]

In the Netherlands, it was concluded that parental education is needed to reduce the prevalence of passive smoking in infancy.[12] Well-baby clinics were chosen to deliver this program because of the frequent contacts of parents and children with this type of preventive health care. Doctors and nurses in the well-baby clinics offer preventive childcare for 0–4 year olds. Approximately 97% of Dutch infants visit a well-baby clinic regularly. During the pre-school period, parents and children may attend the child health clinic about 10 to 14 times.[16]

Prevention of passive infant smoking by well-baby clinics
According to a study in 1994, most nurses and doctors in the well-baby clinics thought it was their task to give education on passive smoking in infancy (78%). However, only a small percentage did so (27%). Barriers to giving education on passive smoking were that they lacked time and did not have information materials on this subject.[17]
To provide such materials, STIVORO and TNO Prevention and Health developed, in 1996/1997, an education program on passive smoking in infancy titled 'Smoking? Not in presence of the little one'. The education program consisted of a leaflet for parents and a manual for health professionals. These materials were developed on the basis of an inventory of available prevention programs, a study of the factors influencing passive infant smoking and the theoretical construct Stages of Change.[18]

Inventory of available prevention programs
At the start of the development process, an inventory was made of the available programs. This showed that the counselling program of Strecher et al.[19] was particularly successful, mainly because it aimed at increasing parental self-efficacy regarding the prevention of passive infant smoking and not at parental smoking cessation. This American program, however, took four home visits of 45 minutes each, whereas in the Dutch well-baby clinics about 10 minutes are available for each visit. Additionally, Dutch opinion towards smoking differs from the American opinion in such a way that different factors may be relevant for the prevention of exposure to tobacco smoke.

Factors influencing passive infant smoking
To obtain information on factors relevant to the prevention of passive infant smoking in the Netherlands, a study was conducted on the behavioural factors influencing passive smoking in infancy, in 1996.[20] This study suggests that health education efforts should focus on the attitudes and self-efficacy of parents, and in particular on the health consequences of the exposure of young children to tobacco smoke. Special attention should be paid to smokers with a low educational level. The results also indicated that education should strengthen the ability of non-smoking parents to deal with smokers.[20] The conclusions of this study were used in the development of the education program.

Stages of Change construct as theoretical basis
The Stages of Change construct was used as the theoretical basis of the program[18] because the 1996 study showed rather large differences between groups of parents regarding their preventive behaviour in passive infant smoking.[11] This construct provides a conceptual framework to cope with variations in the motivational stages of persons by means of tailored education. This means that some persons need more education than others. The model distinguishes the following phases: precontemplation, contemplation, preparation and action, and maintenance. In the case of passive smoking, some parents are not at all aware of the negative consequences of passive smoking in infancy (precontemplation phase). Some parents are already aware of the consequences but do not know how to handle it (contemplation phase). Again, some other parents have already taken some action to prevent passive smoking (preparation and action phase), and parents in the last phase have to continue their behaviour (maintenance phase). These phases need different kinds of educational approaches.

To be able to give tailored education on passive infant smoking a five-step procedure was developed for health professionals to discuss the subject. The five steps were:
1) assessing the occurrence of smoking at home and in the presence of the child.
2) discussing the possible health consequences of passive smoking.
3) assessing the readiness of parents to prevent passive smoking and discussing possible house rules.
4) discussing and taking away barriers during the implementation of the house rules.
5) Following-up the implementation and maintenance of the house rules.

The health professionals were advised to follow the first two steps of the procedure at the first contact with the parents, then the other two steps in the following contact and to follow-up regularly. Steps 3, 4 and 5 depended on the opinions, knowledge, motivation and skills of parents regarding passive infant smoking. Parents who are in the precontemplation phase of the stages of change construct need much more attention from health professionals during these steps than parents in the preparation and action phase. The main message of the education program was that parents should refrain from smoking in the presence of the child. In the leaflet for parents all five steps are discussed.

Dissemination and implementation

In 1997, the education program was disseminated in three phases to all Dutch well-baby clinics and all parents. The first phase was directed at doctors and nurses in the well-baby clinics. The materials of the education program were mailed to each clinic, and all were offered a free-of-charge training. In this training the education program was explained and nurses and doctors could practise the education in role-plays. The second phase of the dissemination was directed at parents of young children. In March 1998 the Dutch Minister of Health started this campaign and at the same time attractive materials (posters, stickers, etc.) were mailed to nurses and doctors in the well-baby clinics. Local radio stations received a recorded interview that they could use for an item on passive infant smoking. Articles were published in magazines for (pregnant) parents. The third phase was directed at family and friends: during one month in 1999, a TV-spot on passive infant smoking was broadcast regularly and this was repeated in 2000.

Evaluation

The aim of the present study was to assess the effectiveness of the education program 'Smoking? Not in presence of the little one'. The prevalence of smoking in the presence of infants aged 0–10 months before (in 1996) and after the implementation of the program (in 1999) was compared.

METHODS

Data collection

In 1996 sixteen home-care organisations were asked to participate in the study, one from each of the four major cities of the Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht) and one from each Dutch province.[11] The Dutch well-baby clinics form a part of the home-care organisations. Fourteen organisations agreed to participate: the four major cities and 10 provincial associations. Each organisation was asked to make a random selection of five well-baby clinics according to a specific procedure. Each of these clinics issued a questionnaire to the first 40 parents with a baby aged 1 to 14 months who visited the well-baby clinic and agreed to take part in the study. Parents were excluded if they could not read or write Dutch. The home-care organisations received 2,800 questionnaires and eventually distributed 2,720

questionnaires, which the parents filled out at home. In total 1,715 parents completed the questionnaire (response 63%). For this study only the questionnaires completed by mothers with an infant aged 0 to 10 months were selected (n=1,129). The average age of mothers was 31 years and the average age of partners was 33 years. The average age of mothers was slightly higher than the average age of mothers with newly born children in the Netherlands.[21] Twenty-seven percent of the mothers had a high educational level. This is slightly higher than the percentage in the overall distribution of the educational level for women in the Netherlands (22%).[11, 22]

In the survey of 1999 all home-care organisations in the Netherlands (N=66) were asked to randomly select four to five well-baby clinics. The home-care organisations could give the number of questionnaires that they wanted to distribute among mothers with an infant aged 0 to 10 months in each selected well-baby clinic. Eventually 39 home-care organisations (including the four major cities) participated with 170 well-baby clinics. They received 3,755 questionnaires in total and 2,534 mothers returned the questionnaire (response 67%).[23] Data on parental education and age were not included in this study. Therefore a comparison with the total Dutch population regarding these characteristics was not possible.

Data on birth weight of the child, age of the child (in months), order of the child in the family, and gender of the child were asked for in both studies. The two groups of respondents did not differ regarding these characteristics ($p>0.05$).
In both studies the written information accompanying each questionnaire assured parents of anonymity and confidentiality. Their names were not requested. The parents were asked to complete the questionnaire at home and to return it in a stamped addressed envelope.

Data
Both surveys asked for parent-reported smoking in the living room in the presence of infants by parents and visitors in the seven days before completing the questionnaire (hereinafter: passive infant smoking), together with maternal and paternal smoking and background characteristics. It was decided to use parent-report on passive infant smoking for two reasons. First, biological measures, like the assessment of cotinine concentrations, are difficult to implement in community studies. Second, biological measures may cause more bias than self-reported measures. Many parents refuse these measures, causing 'strong' selection bias, and if not refused their use may in itself change parental behaviour. A recent review of Hovell et al. indicates regarding the association between biological and reported measures that: 'The consistency in direction of these associations across independent studies is reassuring and suggests that reported measures can be satisfactory indicators of exposure. This conclusion is bolstered by the observation that relationships between reported measures and biological indicators are about the same between biological and environmental measures'.[24] These arguments both favoured the use of self-report to measure passive infant smoking.

Analysis

In all analyses both datasets were used. It was first assessed whether the prevalence of passive infant smoking changed between 1996 and 1999, among infants aged 0–10 months. These analyses were repeated with adjustment for all background characteristics that were included in both datasets; birth weight of the child, age of the child (in months), order of the child in the family, and gender of the child. Finally, it was assessed whether changes between 1996 and 1999 differed for smoking and non-smoking parents by including the interaction term of parental smoking with the year of measurement. All analyses were done with logistic regression using SPSS version 10 for Windows.[25]

RESULTS

The prevalence of passive infant smoking decreased between 1996 and 1999, from 41% to 18% (Table 1). The prevalence of maternal smoking also decreased slightly (from 24% to 20%).

The prevalence of passive infant smoking decreased between 1996 and 1999 with statistical significance (odds ratio (OR), (95% confidence interval (CI)): 0.32 (0.27–0.37)). Parental smoking and several background characteristics were associated with passive infant smoking (Table 2). Adjustment for differences between the 1996 and 1999 groups yielded very similar results, showing that none of these confounded the change in prevalence of passive infant smoking between these years. However, the change in passive infant smoking between 1996 and 1999 differed according to parental smoking status (Table 2): the p-value for the inclusion of this interaction was 0.031. We therefore computed ORs for passive infant smoking in 1999 compared to 1996 separately for three subgroups: families in which none, one and two parents smoked. This analysis was repeated with adjustment for age of the child. Adjusted results showed that changes were relatively larger among families in which one parent smoked (Table 2).

Table 1: Prevalence of passive infant smoking by background characteristics, in 1996 and 1999

	Passive infant smoking			
	1996		1999	
	N[1]	Passive infant smoking %	N[1]	Passive infant smoking %
Maternal smoking status				
Non-smoker	846	32	2030	12
Smoker	263	70	503	40
Paternal smoking status				
Non-smoker	711	28	1693	12
Smoker	351	64	813	30
Parental smoking status				
Both parents do not smoke	654	24	1547	9
One of the parents smoke	279	61	641	25
Both parents smoke	178	72	345	42
Age of the child				
0–3 months	458	40	1023	13
4–6 months	398	41	884	21
7–10 months	253	44	626	21
Birth weight of the child				
Less than 2500 grams	53	51	137	23
2500–3499 grams	524	44	1128	20
3500 grams or more	494	36	1188	16
Order of child in family				
First child	541	40	1203	16
Second child	390	41	904	19
Third or subsequent child	174	43	420	20
Gender of the child				
Boy	526	41	1297	17
Girl	577	41	1236	19
Total	**1,129**	**41**	**2,534**	**18**

1 Numbers do not add up to 1,129 (1996) or to 2,534 (1999) due to missing values.

Table 2: Prevalence of passive infant smoking: odds ratios comparing 1999 with 1996, and comparing categories of relevant background characteristics.

	N[1]	Crude OR[2]	p-value[3]	Adjusted OR[4]	p-value[3]
Year of measurement			<0.001		< 0.001
1996[5]	1068	1		1	
1999	2448	0.32 (0.27 to 0.37)		0.34 (0.26 to 0.43)	
Parental smoking status			< 0.001		
Both parents do not smoke[5]	2126	1		1	< 0.001
One of the parents smoke	886	3.58 (2.98 to 4.29)		5.58 (4.09 to 7.60)	
Both parents smoke	504	6.92 (5.61 to 8.55)		8.28 (1.28 to 1.98)	
Age of the child			< 0.001		< 0.001
0 –3 months[5]	1436	1		1	
4 –6 months	1232	1.33 (1.12 to 1.59)		1.42 (1.17 to 1.73)	
7–10 months	848	1.41 (1.16 to 1.70)		1.59 (1.28 to 1.98)	
Birth weight of the child			< 0.001		
Less than 2500 grams	190	1.16 (0.84 to 1.61)			
2500–3499 grams[5]	1650	1			
3500 grams or more	1676	0.75 (0.64 to 0.87)			
Order of child in family			0.146		
First child[5]	1692	1			
Second child	1256	1.15 (0.97 to 1.35)			
Third or subsequent child	568	1.19 (0.96 to 1.48)			
Gender of the child			0.227		
Boy	1766	0.91 (0.78 to 1.06)			
Girl[5]	1750	1			
Parental smoking by year of measurement (interaction effect)[6]					
Both parents do not smoke			< 0.001		< 0.001
1996[5]	628	1		1	
1999	1498	0.33 (0.26 to 0.42)		0.34 (0.26 to 0.43)	
One of the parents smokes			< 0.001		< 0.001
1996[5]	270	1		1	
1999	616	0.21 (0.16 to 0.29)		0.19 (0.14 to 0.27)	
Both parents smoke			< 0.001		< 0.001
1996[5]	170	1		1	
1999	334	0.29 (0.20 to 0.43)		0.30 (0.20 to 0.44)	

1 Numbers do not add up to 3,663 due to missing values.
2 OR= odds ratio, 95% confidence interval.
3 p-value for inclusion of the characteristics in the logistic model.
4 Adjusted for all other characteristics that are mentioned in the table (year of measurement, parental smoking, parental smoking by year of the measurement, order of the child in the family, age, birth weight and gender of the child).
5 Reference category.
6 Crude and adjusted for all other background characteristics mentioned above.

DISCUSSION

This study shows that the prevalence of passive infant smoking in the Netherlands more than halved after the national implementation of an education program aiming at (its) reduction. The change was largest when only one parent smoked. It was expected

that the highest passive infant smoking rate before the education program had the greatest potential to change: this was the case when both parents smoke. Passive infant smoking did decrease in this group but not as much as among parents with just one smoker. An explanation may be that it is more difficult to change behaviour when both parents smoke than when just one parent smokes: the non-smoking parent can support and motivate the smoking parent in maintaining non-smoking behaviour in the presence of the child. Nonetheless a large decline in passive infant smoking also occurred when both parents smoked.

It seems likely that the observed decrease in passive smoking has been caused by the intervention. No other health education campaigns on this subject were active during this period. Levels of passive infant smoking in 1992 resembled those in 1996.[12] Therefore, a process already started before 1996 could not explain the decline in 1999. Furthermore, the overall prevalence of smoking hardly changed during this period. In 1996, 32% of women smoked and 39% of men, in 1999 it was respectively 31% and 37%.[26] Differences between the 1996 and 1999 samples and between the samples and the general Dutch population could also not explain the decline. Samples hardly differed from each other regarding birth weight of the child, age of the child, order of the child in the family and gender of the child: after adjustment for these characteristics, the results were very similar. Nonetheless, the mothers in the 1996 sample were older and more highly educated than mothers in the general Dutch population. This could have influenced the prevalence rate of passive infant smoking, but one would expect that the prevalence rate of passive infant smoking in 1996 would normally even have been higher. Data on education and age of the mother were not available for the 1999 sample. The 1999 sample, however, did not differ from the general Dutch distribution regarding the order of the child in the family, regarding gender, and regarding birth weight of the child. Despite this, we cannot exclude some degree of selection bias in both samples, but think that this cannot explain the large effect found.

Furthermore, these findings could also be due to a trend that is going on in all countries in western Europe. Unfortunately, few European data are available to verify this explanation, as in most countries no subsequent comparative assessments are available. Such data was found for two Nordic countries, Norway and Sweden. In Norway, Andersen and co-workers found a decrease in the exposure of children to tobacco smoke from 32% in 1995 to 18% in 2001. They assume that a national information campaign called 'Smoke-free Environment for Children - George the Giraffe' caused this decrease. This campaign targets children in the age group 0-9 and their parents. It focuses on three areas: maternity wards, mother and child clinics and school and after school activities (M. Andersen, written communication). In Sweden, a counselling method based on Bandura's self-efficacy concept was developed, called 'smoke-free children'.[27] It studied the development of parental smoking before and after the introduction of this counselling method. After training child health nurses, the annual

decrease was 1.7% in parental smoking in the pilot area and later, when the method was introduced in the county as a whole, 2.7% in the remaining parts.

In the analyses, we could not adjust the results for all potentially relevant social demographic variables, like parental education, parental age and/or marital status explicitly. The latter variables were included in the 1996 questionnaire but not in the 1999 one. Maternal educational level in particular may be associated with prevention of passive infant smoking. In 1996 the prevalence of passive infant smoking was lowest (25%) among mothers with a high educational level. Therefore we assessed the potential effect of selection bias regarding this by simulating a worst-case scenario: 'What if in 1999 only the high educated mothers participated in the study? Might this explain the effect as found instead of the intervention?' We therefore compared the prevalence of passive infant smoking among high-educated mothers in 1996 with that of the total group in 1999. Even in this, unlikely, scenario there would be a real decrease in passive infant smoking of 7%.
In both studies the participating home-care organisations were well spread over the Netherlands. But nonetheless, the mothers in the study of 1996 were a little older and higher educated than the average mothers in the Netherlands at that time.
Underreporting of smoking in the presence of the child could cause a spurious decline, since almost all parents could be expected to know about the harmful effects by 1999. This cannot be excluded but it seems unlikely that such an underreporting would explain the large decline observed. Moreover, the study is concerned with a similar measurement before and after a population-based intervention. Even if it was imperfect, it would only yield biased results regarding the effect of the intervention if measurement errors before and after the intervention are different. There is no evidence for this and we therefore think it justified that in this study, self-reported smoking in the presence of the child in the living room is a valid measure for the effect of parental education about passive smoking on parental behaviour.

The study thus shows a rather large change in parental self-reported behaviour. This corresponds to the findings of Hovell et al.[28], who observed positive effects of seven counselling sessions for mothers by graduate students (three in person and four by telephone). It also corresponds to the findings of Emmons et al.[29], who observed positive effects of a home visit of 30 to 45 minutes followed by three calls of approximately 10 minutes each. However, our results show that less intensive counselling can be equally effective. We think that a main reason for the relatively large effect found is that the program has been integrated in the routine activities of the well-baby clinics and that the attendance rates of these clinics are high. Regarding the integration in routine care, it was recently shown that 71% of nurses in the well-baby clinics joined the program.[30] Andersen and co-workers found similar large effects for the aforementioned Norwegian program, which has also been integrated in routine activities with high attendance, such as routine care at maternity wards and at mother and child clinics. The implementation of this health education program at well-baby clinics has thus been highly successful.

It seems likely that such a change in behaviour will have an impact on the incidence of health problems related to passive smoking in infancy. We therefore recommend the further implementation of similar, structured health education programs in other countries.

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CHAPTER 6

The continuation of use of an education program for the prevention of passive smoking among children

Submitted as: Crone MR, Verlaan M, Willemsen MC, van Soelen P. Reijneveld SA, Hira Sing RA, Paulussen TGWM. Sustainability of the prevention of passive infant smoking within well-baby clinics.

ABSTRACT

This study assessed the antecedents of continuation of use of an education program for the prevention of passive smoking in infants, which was implemented in well-baby clinics of the Dutch home-care organisations. This program consists of a booklet for parents and a five-step procedure for health professionals about discussing passive smoking with parents. A questionnaire was sent to 67 managers, 670 nurses, and 335 physicians working in Dutch home-care organisations. Questions concerned completeness of use, level of institutionalisation, and characteristics of the organisation, of the user, and of the dissemination strategy to which they were exposed. In total 69% of the physicians/nurses indicated that they used the program. Thirty-three percent of the physicians and 82% of the nurses informed parents using some of the five steps. Physicians' completeness of use was related to their perceived responsibility about approaching the subject of passive smoking with parents. Nurses' completeness of use was related to self-efficacy, perceived responsibility, training attendance, perceived personal advantages and perceived level of institutionalisation. It was concluded that the program was widely used for the first steps of the five-step procedure, but the level of institutionalisation was still low. Additional innovation efforts should focus on improving completeness of use and the level of institutionalisation.

INTRODUCTION

There is clear evidence that passive smoking in childhood can lead to serious, adverse health conditions, such as respiratory illnesses, asthma, sudden infant death syndrome, and ear infection.[1;2] The literature also provides some evidence for other adverse health outcomes, like cancer, cardiovascular disease, excessive infant crying, and meningococcal disease.[3-5] There is some evidence indicating an increased risk of behavioural problems later in life.[6] This emphasises the importance of the development and implementation of an effective education program aimed at reducing and limiting young children's exposure to tobacco smoke.

In the Netherlands, physicians and nurses in well-baby clinics, which are run by home-care organisations, provide preventive health care for children 0-4 years. Approximately 97% of Dutch infants make regular visits to a well-baby clinic.[7] Therefore, these well-baby clinics provide an ideal setting for the implementation of prevention programs aimed at reducing passive infant smoking. To support this, in 1997/1998 an education program on passive smoking, entitled 'Smoking? Not in presence of the little one', was developed and disseminated among all well-baby clinics in the Netherlands by STIVORO, the national nongovernmental center for tobacco control. This education program consists of a booklet for parents and a manual for health professionals describing a five-step procedure for educating parents about passive smoking. These steps are: (1) assessing smoking behaviour at home and in presence of the child, (2) discussing the possible health consequences of passive smoking, (3) assessing parental readiness to prevent passive smoking and discussing possible house rules (4) discussing and removing barriers during the implementation of the house rules, and (5) follow-up guidance and maintenance of the house rules.

Between 1997 and 1999, the program was disseminated by STIVORO by means of:

- a mailing: an example set of education materials was sent to all home-care organisation running well-baby clinics along with an invitation to attend a free pre-implementation training (end 1997);
- a pre-implementation training for physicians and nurses (Jan/Feb 1998);
- A first mass media campaign: a nationwide mass media campaign was launched targeting parents; at the same time the well-baby clinics started implementing the education program (March 1998);
- a follow-up mass media campaign: this media campaign was specifically targeting the parents' family members and friends (1999).

Overall, this nationwide attempt to reduce passive smoking among infants appeared to be rather successful. A first evaluation study in 1999 among 85% of all home-care organisations indicated that 91% of the well-baby clinics had initially implemented the program.[12] Simultaneously, the overall prevalence of passive infant smoking in the Netherlands fell from 41% in 1996 to 18% in 1999.[13] It was, however, not possible to determine to which extent the media initiative (TV-spot) or the exposure to the education program had led to the decrease in passive smoking.

After completing the initial dissemination project, the program's continuation within the well-baby clinics became a growing concern. According to Rogers, an innovation passes four stages: dissemination, adoption, implementation and continuation.[8] Within this conceptual framework, continuation is defined as the stage in which innovation remains utilised after its initial implementation. However, many experiences show that initial use of an innovation does not guarantee continuation.[9] Discontinuation may threaten the potential impact of an education program like 'Smoking? Not in presence of the little one', because:[10:11]

- the program should be in place long enough to reach large parts of the population, especially new parents entering the well-baby clinics;
- the intended behavioural change often takes place over a long period of time, repetitive exposure to the message is therefore warranted;
- organisations that use the program devote time and energy to integrating the program in their mission and daily practices, so discontinuation is expensive for the organisation.

Two years after completing the initial introduction of 'Smoking? Not in presence of the little one', the present study was conducted to examine the program's continuation within the well-baby clinics. It addressed the following research questions:

- What is the percentage of physicians/nurses (still) using the program in 2001?
- What is the level of institutionalisation of the education program?
- What are the antecedents of the completeness of use of the program?

RESEARCH FRAMEWORK

The development of the research framework started with the identification of four categories of antecedents of the program's continuation of use: characteristics of the user, characteristics of the organisation, characteristics of the innovation, and characteristics of the innovation strategy.[14] Most health organisations, like the well-baby clinics of Dutch home-care organisations are professional bureaucracies where health professionals, as individuals or as a group, have considerable autonomy. This implies that the individual health professional is most critical for the innovations' longevity. This also applies to 'Smoking? Not in the presence of the little one', in particular because the nurses and physicians of the well-baby clinics are the ultimate gatekeepers for parents' exposure to the program. Consequently, it was assumed that arrangements at the organisational level, the innovation's design or the characteristics of the innovation strategy would have an indirect impact on the program's utilisation by the individual health professional. In this study, the ultimate outcome criterion was defined as the physicians/nurses' completeness of use of the educational activities provided by the program, combined with the number of parents exposed to these activities.

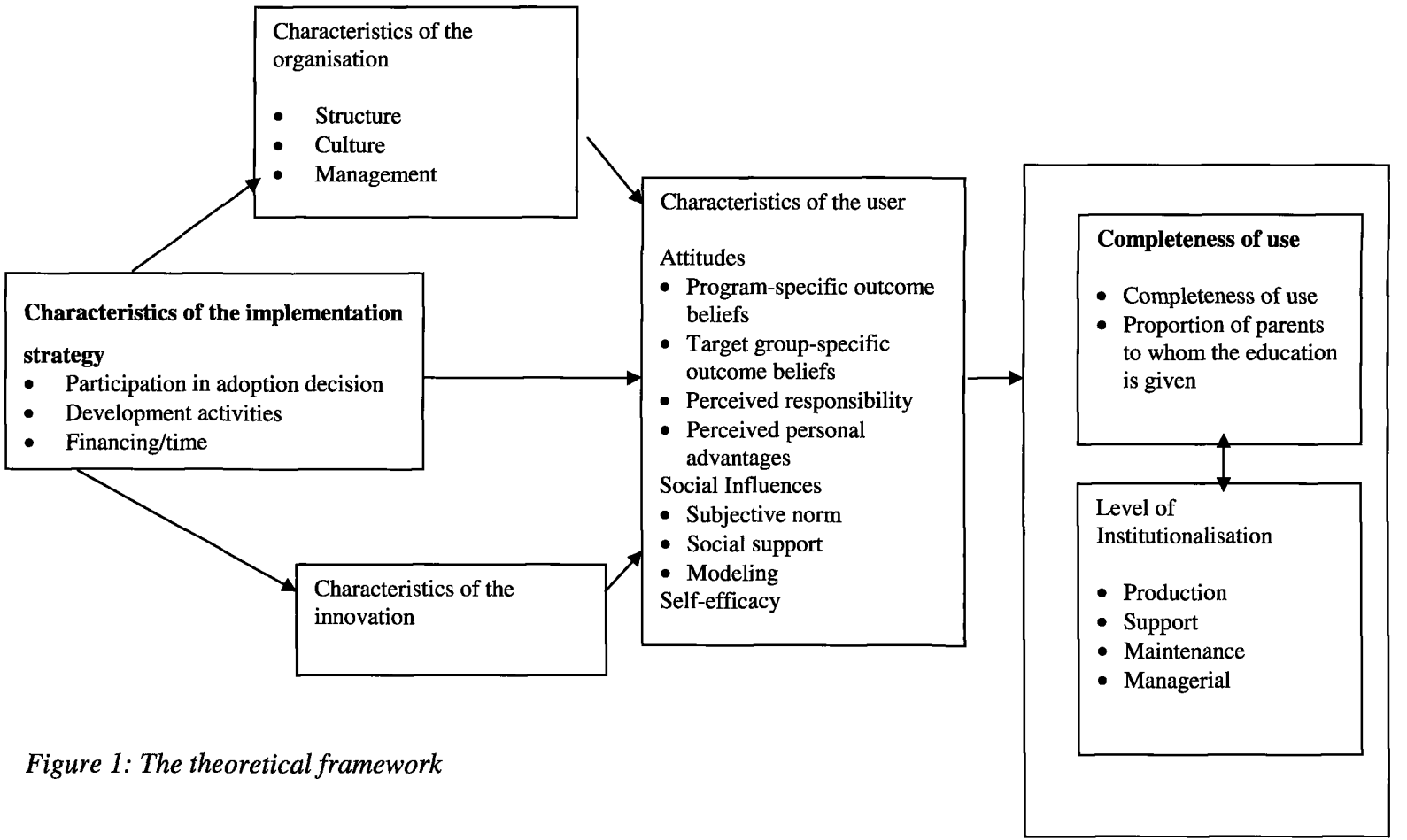

Figure 1: The theoretical framework

Since utilisation of the program by the health professionals can be understood as an intentional act, the Theory of Planned Behaviour and the Social Cognitive Theory were used as a starting point to elaborate the factors constituting the research framework.[15;16] According to our framework, attitudes, social influences and self-efficacy are the most proximal antecedents of "completeness of use" at the individual level. The attitudinal component was divided into four sub-constructs: program-specific outcome beliefs, target group-specific outcome beliefs, perceived responsibility, and perceived personal advantages. Program-specific outcome beliefs refer to the perceived importance and feasibility of the intended learning objectives of this program.[17] Target group-specific outcome beliefs accounted for the users' expectation that the program's effectiveness might differ between specific groups of parents. Interviews with health professionals working in well-baby clinics had indicated that a distinction should be made between smoking versus non-smoking parents and between native versus non-native parents. Perceived responsibility may also determine differences in program utilisation, since respondents may feel positive about the intended educational outcomes but they may not think it is their task to provide the education. Perceived personal advantages refer to the advantages program utilisation might have for the users themselves, such as raising professional status or positive feedback from parents.
In addition, the social context of the user may affect program utilisation.[17;18] Social influences were divided into subjective norms, perceived social support and modeling. Subjective norms are social referents in the users' task environment that provide normative standards for their decision-making about using the innovations. Social support refers to the expected active support of others in using the program, while modeling refers to the perceived behaviour of relevant others regarding the innovation. Self-efficacy has emerged as an important antecedent of innovation processes in general, and more specifically as a determinant of the implementation of health education interventions.[17;19] Self-efficacy refers to a users' perceived competence regarding the educational activities proposed by the program.

Continuation at the organisational level was conceptualised using Goodman and Steckler's model "Levels of Institutionalization". This model indicates that a process of institutionalisation is constituted by the level of routinization and niche saturation in an organisation.[10] The first step of institutionalisation is called "passage": this is the first time the innovation is actually applied. The next step, "routinization", involves the growing permanency of an innovation. The last step "niche saturation", refers to maximum institutionalisation; the innovation is seen as permanent in the organisation. To be fully institutionalised, an innovation must be niche saturated within four subsystems: the production, the managerial, the support, and the maintenance subsystems. In our view, the level of institutionalisation may ultimately affect the intended learning outcomes of parents by facilitating program utilisation by individual health professionals.
Other characteristics on the organisational level such as structure, culture, and management of the organisation may also be relevant. The structure is the way the organisation is organised to achieve its objectives.[20] Examples of structural factors are

hierarchical structure, division of tasks, and workload.[21;22] The culture consists of the ideas, values and norms resulting from shared experiences and shared learning within an organisation.[23] The management of the organisation is seen in terms of prevailing communication and management style. Communication style involves factors such as clarity, feedback, and communication channels.[20;24-27] Management style can be divided into three broad categories: participative, task-driven, and relation-driven.[28]

Characteristics of the innovation itself also have been shown to affect innovation processes, examples being relative advantage, complexity, triability, observability and compatibility.[8] Others have identified a number of additional attributes such as perceived attractiveness, instrumentality (procedural clarity)[29;30] and rigidity[31].

Finally, the applied innovation strategy may be more, or less, successful in facilitating the intended innovation process. Examples of the conditions for an effective strategy are the combination of bottom-up and top-down strategies, sufficient information, funding and evaluation.[32]
The theoretical framework that was used to answer the research questions is summarised in Figure 1.

METHODS

Interviews were conducted with nurses and physicians employed by well-baby clinics and with the managers of the clinics. The interviews were used to explore salient beliefs about the program among members of the intended user population. These interviews provided leads for writing the questionnaire items constituting the factors of our framework. After pre-testing, the questionnaire was distributed to all Dutch home-care organisations that offer well-baby care with the exception of two that participated in the pretest. Each organisation received 16 forms: 5 for physicians, 10 for nurses and 1 abbreviated version for the manager. The questionnaires were designed in such a way that both users and non-users of the program could complete the questionnaire. Questions about the characteristics of the user and about completeness of use were excluded from the manager's questionnaire. Finally, 670 forms for nurses, 335 forms for physicians and 67 forms for managers were sent to the organisations.

The questionnaire

The operationalisation of the completeness of use index and the level of institutionalisation index are described in this paragraph. A brief overview of the other constructs in our framework, including internal consistency and scale characteristics, is shown in Table 1.

Table 1: The variables included in the analyses.

Concepts	Verifiable indicators	N questions	Unit	Scale&	Range
1 Characteristics of the organisation					
1.1 Structure	1.1.1Workload	1	Continuous		-4 to +4
1.2 Culture	1.2.1 Number of physicians	1	Continuous		4 to 43
	1.2.2 Number of nurses	1	Continuous		8 to 87
	1.2.3 Number of children	1	Continuous		2625 to 34500
	1.2.4 Proportion of immigrant children	1	7-point Likertype scale		1 to7
1.3 Management style	1.3.1 Communication	4	7-point Likertype scale	α =0.91, sum 1.3.1, 1.3.2	-3 to +3
	1.3.2 Management	3			
2 Characteristics of the user					
2.1 Program specific outcome beliefs*	2.1.1 Importance of different goals of program	5	7-point Likertype scale	α =0.88	1 to 7
	2.1.2 Evaluations of feasibility of these goals	5	7-point Likertype scale	α =0.90	1 to 7
2.2 Target group specific outcome beliefs	2.2.1 Evaluations of feasibility of outcome among specific groups of parents	4	7-point Likertype scale	α =0.73	-3 to +3
2.3 Responsibility	2.3.1 Responsibility physicians/nurses to inform all parents on passive smoking	3	7-point Likertype scale	α =0.60	-3 to +3
	2.3.2 Responsibility physicians/nurses to inform only when child is ill	2	7-point Likertype scale	α =0.78	-3 to +3
2.4 Perceived advantages	2.4 Personal advantages of using the program	4	7-point Likertype scale	α =0.62	-3 to +3
2.5 Subjective norm work*	2.5.1 Normative beliefs of colleagues about respondent's use of the program	3	7-point Likertype scale	α =0.93	-3 to +3
	2.5.2 Motivation to comply to opinion of colleagues	3	7-point Likertype scale	α =0.96	1 to 7
2.6 Subjective norm parents*	2.6.1 Normative beliefs of parents about respondent's use of the program	4	7-point Likertype scale	α =0.88	-3 to +3

Concepts	Verifiable indicators	N questions	Unit	Scale&	Range
	2.6.2 Motivation to comply to the opinion of parents	4	7-point Likertype scale	α =0.97	1 to 7
2.7 Social support	2.7.1 Active support of colleagues to use the program	2	7-point Likertype scale	α =0.75	-3 to +3
2.8 Modeling	2.8.1 Use of the program by others	2	7-point Likertype scale	α =0.73	-3 to +3
2.9 Self-efficacy	2.9.1 Ability to use the program	11	7-point Likertype scale	α =0.77	-3 to +3
3 Characteristics of the innovation					
3.1 Characteristics of the education program	Relative advantage, complexity, observability, compatibility attractiveness, instrumentality, rigidity	7	7-point Likertype scale	α =0.79	-3 to +3
4 Characteristics of the innovation strategy					
4.1 Participation in the adoption	4.1.1 Formal adoption decision	1	Dichotomous		No/yes
	4.1.2 Participation in adoption decision	1	Dichotomous		No/yes
4.2 Development activities	4.2.1 Training	1	Dichotomous		No/yes
	4.2.2 Coordinator	1	Dichotomous		No/yes
	4.2.3 Evaluations	1	Dichotomous		No/yes
	4.2.4 Triability	2	7-point Likertype scale	α =0.66	-3 to +3
4.3 Resources	4.3.1 Finances and time	1	Dichotomous		No/yes
5 Background variables					
5.1 Age	Age of respondent	1	Continuous		21 to 60
5.2 Number of years work experience	Years working as nurse/physician	1	Continuous		0 to 10
5.3 Smoking	Smoking by respondent	1	Dichotomous		No/yes

*The two constructs were included separately. Their multiplicative composites were not used because they did not significantly change the percentage of variance explaining completeness of use after inclusion of the separate constructs.

& The alphas were based on the total group of physicians and nurses.

Completeness of use
Completeness of use was measured as the weighted result of the proportion of parents who were exposed to the education and the extent to which the five steps of the intended education procedure were followed when providing the education. The proportion of parents was measured by one 7-point scaled item varying from "No one gets the education" to "Everyone gets the education". Adherence to the five steps was measured using six questions based on the five steps of the program and an additional question about making a note in the medical file of the child after passive smoking had been discussed (α=0.78). Factor analysis indicated that they represented one factor, explaining 53% of the variance. The sum score of these six questions was multiplied by the proportion of parents to whom the education was given.

Level of institutionalisation
The level of institutionalisation was measured by the extent to which routinization and niche saturation had taken place in the production, support, maintenance and managerial subsystem. Seven activities appeared to represent these four subsystems, as was confirmed by factor analysis:

- Production. The presence of (1) written guidelines for using the program, (2) evaluation procedures for the use of the program, and (3) guidelines for making note of the education process in the child's file.
- Maintenance. (4) The allocation of time and/or funding.
- Support. (5) Training new staff in the use of the program.
- Managerial. (6) Formal assignment of a coordinator to the program, and (7) feedback of evaluation outcomes to the staff.

For each activity, a routinization and a niche saturation question was formulated. The routinization question assessed the number of years the activity was already present in the organisation. As proposed by Goodman and Steckler, the answers were recoded into the four categories: "no passage" to "four or more iterations". For example, in the case of the coordinator, no passage means that no coordinator was assigned to the program, and four or more iterations meant that the coordinator had already been present for more than two years. The niche saturation was assessed by asking the respondents how permanent they thought the activities were in their organisation. The answers were recoded into four categories varying from "no niche saturation" when the activity was not seen as permanent, to "maximum niche saturation" when the activity was thought of as being definitely permanent. In every subsystem, the routinization and the niche saturation questions were summed, resulting in a routinization and a niche saturation scale in each subsystem. The routinization and niche saturation scales within each subsystem appeared to be highly correlated (varying from r=0.81 to r=0.95). The two scales in each subsystem were therefore summed, resulting in four scales representing the level of institutionalisation in the production, maintenance, support and managerial subsystems.

Analyses

Analyses were done separately for physicians and for nurses using the Statistical Packet for Social Sciences 11.5 (SPSS). Factor analysis, reliability analysis (Cronbach's α) and homogeneity analysis (Homals) were applied to construct the scales used for modeling completeness of use. Regression analyses were used to explore whether the assumed multiplicative versions of the attitude and the subjective norm concepts were better than the additive versions.[33] Spearman correlation coefficients were calculated between the constructs in our framework. The factors that significantly correlated with the criterion ($p<0.05$) were selected for modeling completeness of use. Initially, multi-level regression techniques were applied to account for the possibility of clustering effects among nurses/physicians and home-care organisations (Mlnwin).[34] Since the variables on the level of the organisation did not affect completeness of use on the individual level, the analyses proceeded with using normal linear regression (stepwise) following the causal pathway represented by Figure 1: starting with the inclusion of the level of institutionalisation, followed by the characteristics of the user, followed by the characteristics of the innovation and the organisation, and then the characteristics of the innovation strategy. Finally, significant predictors of completeness of use were analysed in more detail by means of t-tests, using the mean as a cut-off point to dichotomise completeness of use.

RESULTS

In total 358 nurses (response 53%), 157 physicians (response 47%) and 47 managers (response 70%) completed the questionnaire. The responding nurses and physicians worked in 56 home-care organisations (84% of the Dutch home-care organisations).

Six percent of the nurses, 19% of the physicians and 2% of the managers appeared to be unaware of the existence of this education program. Seventy-one percent of the nurses, 42% of the physicians, and 83% of the managers indicated that they used the program.

There was a remarkable variation in the proportion of users within home-care organisations. In the organisations with responding nurses, the proportion of users among nurses varied between 19% and 100% (66% on average). In two organisations, none of the nurses used the program.

Completeness of use

Thirty-three percent of the responding physicians and 82% of the responding nurses provided the education to the parents. The first three steps of the five-step procedure were applied most often. Discussing barriers to the prevention of passive smoking and, in particular, the intended follow-up were implemented less frequently. The difference between the nurses' and the physicians' mean score for completeness was statistically significant: 52.6 (SD=19.4) versus 34.6 (SD=20.4) respectively (scale range 0 to 96), ($F=45.0$, $p<0.001$).

Table 2: Summary statistics of the factors within the research framework; means, correlations with completeness of use, and differences between nurses, physicians and managers.

	Nurses, n=255		Physicians, n=68		Managers, n=39
Measured variables (scale range)	Means	r completeness	Means	r completeness	Means
Completeness of use (0-96)	53	--	35	--	n.a.
Characteritics of the organization					
Level of institutionalisation					
	1.9	0.42	1.9***	n.s.	2.5
	1.2	0.14	1.1***	n.s.	1.7
	1.3	0.23	1.2***	n.s.	1.8
	1.6	0.17	1.5***	n.s.	2.3
Management style (-3- +3)	0.9	n.s.	0.7	n.s.	n.a.
Workload (-4- +4)	-1.8	n.s.	-1.7	n.s.	n.a.
# physicians	17.7	n.s.	15.7	n.s.	16.9
# nurses	34.2	n.s.	31.7	n.s.	33.1
#children	10565	n.s.	9565	n.s.	11088
% immigrant children	5.3	n.s.	5.3	n.s.	n.a
Characteristics of the user					
Importance beliefs (1-7)	6.5	n.s.	6.6	0.24	n.a.
Feasibility evaluations (1-7)	5.3	0.15	5.2	0.24	
Target group-specific outcome beliefs (-3- +3)	0.8	0.16	0.6	n.s.	n.a.
Responsibility to inform all parents (-3- +3)	2.0	0.27	1.8	0.42	1.9
Responsibility by indication (-3- +3)	1.6	0.19	1.1*	-0.36	1.3
Perceived personal advantages (-3- +3)	0.8	0.29	0.2***	n.s.	n.a.
Normative beliefs colleagues (-3-+3)	2.0	0.24	1.6**	n.s.	n.a.
Motivation to comply colleagues (1-7)	4.0	n.s.	4.3	n.s.	
Normative beliefs parents (-3-+3)	0.4	0.23	-0.2***	n.s.	n.a.
Motivation to comply parents (1-7)	3.9	n.s.	3.8	n.s.	
Social support (-3- +3)	1.0	n.s.	1.2	n.s.	n.a.
Modeling (-3- +3)	1.1	0.31	1.5**	n.s.	n.a.

Measured variables (scale range)	Nurses, n=255 Means	r completeness	Physicians, n=68 Means	r completeness	Managers, n=39 Means
Self-efficacy (-3- +3)	0.9	0.38	0.5***	n.s.	n.a.
Characteristics of the innovation (-3- +3)	1.3	0.26	1.0*	n.s.	1.3
Characteristics of the innovation strategy					
Triability (-3 - +3)	0.01	0.21	-0.6***	n.s.	n.a.
% Evaluation	28%	0.19	27%	n.s.	41%
% Training	52%	0.27	65%	n.s.	59%
% Appointed coordinator	30%	0.14	21%	n.s.	23%
% Allocation of finance/time	9%	0.14	4%	n.s.	15%
% Organisations adopting the program	87%	0.16	93%	n.s.	92%
% Personally participated in adoption decision	17%	0.16	15%***	n.s.	82%

*Differences between nurses, physicians and managers; *<0.05, **<0.01, ***<0.001, n.a.= questions not asked to managers, n.s.= no significant correlation with completeness of use.*

Level of institutionalisation
No differences were found between nurses and physicians for their perceived level of institutionalisation within their organisation. The level of institutionalisation appeared to be the highest within the production subsystem (mean 1.9, SD=0.8), followed by the managerial subsystem (mean 1.6, SD=0.9), the maintenance subsystem (mean 1.3, SD=0.8), and the support subsystem (mean 1.2, SD=0.6). Overall, the managers perceived higher levels of institutionalisation than nurses and physicians did (Table 2).

Antecedents of completeness of use
Table 2 shows the correlation coefficients for the different factors with completeness of use for physicians and nurses. Nurses' completeness of use correlated with nearly all factors in the research framework, except those accounting for the characteristics of the organisation. The physicians' completeness of use only correlated with program-specific outcome beliefs, perceived responsibility for educating all parents, and perceived responsibility to educate only by indication (when the child appears to be suffering from smoking related health problems).

The regression analysis indicated that the physicians' use of the program was best explained by their perceived responsibility for educating all parents about passive smoking. Nurses' completeness of use appeared to be best explained by their perceived level of institutionalisation in the production subsystem, self-efficacy, perceived responsibility for educating all parents and for education by indication, perceived personal advantages, and attendance to the program's training course (Table 3).

Table 3: Results of the stepwise regression analyses on the physicians' and nurses' completeness of use of the education program.

	Physicians (n=68)		Nurse's (n=255)	
	Adjusted ß	P<	Adjusted ß	P<
Characteristics of the user				
Responsibility to inform all parents	9.01 (4.15 – 13.88)	0.001	3.28 (0.68- 5.88)	0.05
Responsibility by indication			1.67 (0.23- 3.11)*	0.05
Self-efficacy			6.72 (2.86- 10.60)	0.001
Perceived personal advantages			2.62 (0.10- 5.24)	0.05
Characteristics of the innovation strategy				
Training No			0	0.05
Yes			5.17 (0.93- 9.42)	
Level of institutionalisation				
Production subsystem			6.30 (3.48- 9.12)	0.001

* A positive ß means that respondent is less inclined to think responsibility is limited to responsibility by indication.

When analysing the nurses' self-efficacy expectations in more detail (Table 4), it appeared that nurses with relatively low scores for completeness of use were generally least self-confident about educating parents who do not acknowledge the importance of the prevention of passive smoking. They were less self-confident about following all steps of the prescribed program and registering the subsequent steps on the intervention card for each child in care. Compared to nurses with higher levels of use, nurses with lower scores were also less self-confident about providing the education under time pressure; in reducing barriers to the implementation of house rules; and in creating openness for discussion with immigrant parents.

Unlike the physicians, the nurses scored relatively high on their perceived responsibility for educating parents about passive smoking. Nurses with lower completeness of use found it less their task to provide the education than nurses with higher completeness of use.

The nurses anticipated moderate personal advantages from using the program. A significant difference in the expected positive reactions of parents and the anticipated personal satisfaction was found between nurses with relatively high versus low completeness scores.

As far as the level of institutionalisation is concerned, compared to nurses with lower scores for completeness of use, nurses with higher scores perceived all activities in the production subsystem as being more permanent (Table 4). The guidelines for making note of the education process in the medical file of the child appeared to be most institutionalised.

DISCUSSION

The education program 'Smoking? Not in the presence of the little one' is used by the majority of nurses and by a significantly lower proportion of physicians. In most cases, when the program was used, the parents were exposed to the first three of the five-step procedure. The most important predictor of completeness of use by physicians appeared to be their perceived responsibility to educate parents on passive smoking. The nurses' completeness of use was best predicted by their perceived institutionalisation in the production subsystem, self-efficacy, responsibility, perceived personal advantages and attendance to the training course.

Table 4: The individual questions constituting the significant predictors of nurses' completeness of use by dichotomised completeness of use.

	Low completeness of use (score < 52.5) N=137 Mean score	High completeness of use (score ≥ 52.5) N=118 Mean score	Total N=255 Mean score
Responsibility (score –3 to +3)			
Passive smoking is an important subject, about which the home-care organisation should provide education	2.5	2.7*	2.6
I think it is the responsibility of the nurse to give standard information about passive smoking	1.9	2.5**	2.2
I think it is the responsibility of the physician to give standard information about passive smoking	1.1	1.5**	1.3
Responsibility by indication (score –3 to +3) [$]			
I think that the well-baby nurse should inform parents about passive smoking when children have problems associated with it	1.6	2.1*	1.8
I think that the well-baby physician should inform parents about passive smoking when children have problems associated with it	1.3	1.7*	1.5
Self-efficacy (score –3 to +3). Do you think you will be able			
... to keep enough educational material in stock?	1.5	1.5	1.5
... to pay attention to passive smoking even when you have little time during the contact	1.1	1.6**	1.3
... to fill out the intervention card for every child in your care	-1.0	-0.3*	-0.6
... to follow the five steps of the education for every child in your care	-1.2	-0.4**	-0.8
... to make parents who do not see the importance of preventing passive smoking implement house rules	-0.2	0.1*	-0.03
... to discuss passive smoking when you enter a home where there is an obvious smell of tobacco smoke	1.7	1.8	1.8
... to reduce parental barriers to implementing house rules	0.8	1.1*	0.9
... to create enough openness to make passive smoking open to discussion with native Dutch parents who smoke	1.3	1.5	1.4
... to create enough openness to make passive smoking open to discussion with native Dutch parents who do not smoke	1.9	2.1	2.0
... to create enough openness to make passive smoking open to discussion with immigrant parents who smoke	1.0	1.2*	1.1

	Low completeness of use (score < 52.5) N=137 Mean score	High completeness of use (score ≥ 52.5) N=118 Mean score	Total N=255 Mean score
… to create enough openness to make passive smoking open to discussion with immigrant parents who do not smoke	1.4	1.7*	1.5
Perceived advantages, score –3 to +3			
Providing the education gives me a lot of satisfaction	1.1	1.5**	1.3
Providing the education takes too much time	0.4	0.8*	0.6
Providing the education is often at the cost of other activities	0.7	0.8	0.8
Parents in general react very positively when I provide the education	0.6	1.1**	0.8
Institutionalisation in production subsystem: niche saturation, score 1 to 4			
Permanency of guidelines on how to use the program	1.6	2.2**	1.9
Permanency of guidelines on how to register the education process in the personal file of the child	1.7	2.8**	2.2
Permanency of the evaluation of the education	1.4	1.8**	1.6
Training			
Attendance training %n	42%	63%*	52%

[S] A positive score means that the respondent is less inclined to think responsibility is limited to responsibility by indication

* Difference between low and high completeness of use is significant $p<0.05$; ** $p<0.001$

Methodological considerations

Since the overall response among the nurses and the physicians was 51%, selection bias cannot be excluded. Users of the program may have been over-represented, in which case the real percentage of users among the intended user population might be lower than the reported 71% for nurses and 42% for physicians. Assuming a worst-case scenario, i.e. that all non-responders are non-users, the data of this study would suggest that at least 38% of the nurses and 20% of the physicians actually use the education program. This is still a fairly good implementation rate two years after completing the initial dissemination project. It is also important to notice that the responding nurses and physicians are employed by 84% of all home-care organisations in the Netherlands, representing a majority of the organisations. Social desirability may also have affected the results, especially leading to overestimated prevalence or mean scores. But as far as these biases have been systematic, and we have no indication for the opposite, correlation analyses are expected to be less vulnerable to selective attrition and social desirability than prevalence estimates.

In this study the Theory of Planned Behaviour and the Social Cognitive Theory grounded the development of the integrated model that we applied for explaining processes of innovation decision making.[15;16] By doing so, our first interest was to uncover leads for improving the programs' sustainability in practice, rather than to improve theory. For example, we had no intention to assess the added value of our model compared to the originally conceived models by Ajzen and Bandura, respectively. Nevertheless, the results of the regression analyses indicated a fairly good fit of the applied model, especially for explaining the nurses' completeness of use. This was confirmed by an additional path analysis of the nurses' data. The comparative fit index of 0.98 (0 meaning no fit and 1 meaning excellent fit) indicated that the level of institutionalisation (production subsystem), the characteristics of the user (attitudes, self-efficacy), which in turn are influenced by the characteristics of the innovation and the innovation strategy, represented an adequate fit to the data.

Considering the outcomes of other studies

It is not surprising that the physicians' completeness of use was primarily explained by the extent to which they feel themselves responsible for educating parents about passive smoking. In most well-baby clinics the tasks are divided between the physicians and nurses. Nurses usually address health education issues with parents.

The most important predictor for the nurses' completeness of use appeared their perceived level of institutionalisation of the program in the production subsystem, in particular the presence of guidelines for making notes of the education process in the child's medical file. These guidelines existed according to half of the nurses. Institutionalisation in the other subsystems (managerial, maintenance and support) had relatively less impact on nurses' program implementation. This is mainly due to the fact

that little had changed in these subsystems. These results correspond to the findings of Goodman et al.[10] They conclude that health education programs first get institutionalised in the production subsystem, followed by the managerial subsystem, then in the maintenance and support subsystem.

Our finding that the managers of the home-care organisations perceived higher levels of institutionalisation than nurses and physicians corresponds with results of other studies. Others have indicated similar discrepancies between management and staff with respect to the actual implementation of innovations within their organisation.[17;35] When perceived institutionalisation by the manager was included in the analysis instead of perceived institutionalisation by nurses, the level of institutionalisation was no longer significantly associated with the nurses' completeness of use. This discrepancy suggests that on the management level more attention is thought to be paid to the institutionalisation of the program than is observed at the work floor. The managers therefore should invest more efforts in promoting their activities on the level of institutionalisation among nurses and physicians in their organisation.

The importance of self-efficacy fits with the results of other studies on the antecedents of innovation processes.[17;19] Completeness of use was significantly higher among nurses who felt more confident about providing the education. Nurses' anticipated mastery with respect to following all the prescribed steps of the education process and educating parents who do not acknowledge the importance of the prevention of passive smoking appeared to be particularly critical. Those steps of the education process that were implemented by the majority confirmed this finding. The last two steps, discussions about barriers and follow-up were more often neglected. Nurses who had been trained in using the program had a higher completeness of use. However, it was remarkable that training was not associated with higher levels of self-efficacy. Being trained was associated with a higher perceived institutionalisation in the production subsystem, a less communication-driven management style, higher score on triability, more non-Dutch children in care, and more working experience. Considering these results, the lack of association between training and self-efficacy might be explained by the fact that the training mainly affected the nurses' completeness of use by improving both their awareness of and commitment to the proposed educational procedures. Training attendance might also be a weak indicator for the physicians'/nurses' commitment to the innovation when their manager more or less obliged them to do so.

Finally, the anticipated personal advantages of using this program seemed important. Nurses who expected more personal advantages, in particular more positive reactions from parents, complied more with the five-step procedure of the education. Since most nurses had already been using the program for a substantial period of time, this result suggests that initial use at least confirmed the expected personal advantages.

Implications

A high percentage of the health professionals worked with the education program 'Smoking? Not in the presence of the little one'. This high prevalence of use does not automatically imply complete use. Additional activities are necessary for improving completeness of use. One way is to overcome the nurses' perceived barriers to follow the last two steps of the five-step procedure. The training should therefore focus on strengthening self-efficacy expectations. Suggestions for designing these trainings can be derived from research on the conditions for effective staff development[32] and Social Cognitive Theory.[16] These findings suggest that it is necessary to incorporate the following training components: (a) rationale behind the skills and strategies to be learned, (b) demonstration of good practices (direct modeling), (c) opportunities for the practice of skill under simulated conditions (guided enactment), (d) performance feedback (non-evaluative), and (e) coaching during the self-directed application of acquired skills. It is important for more health professionals to be exposed to these training conditions. At the time of this study, only 50% of the users had received training. In addition, institutionalisation in the production subsystem, as well as the other subsystems, should be further strengthened. A procedure should be developed for training new staff in using the program (maintenance subsystem). Home-care organisations should allocate time and/or financial resources for attending necessary training (support subsystem). Each organisation should appoint and instruct a coordinator who directs and monitors the program's implementation. Coordinators or program champions, people who strongly advocate the continuation of an innovation, have proven their importance for the sustainability of innovations.[36;37] They should not only advocate continuation within their own organisation, but they should also coach nurses and physicians during processes for the self-directed application of newly-acquired skills.

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CHAPTER 7

Prevention of starting smoking among adolescents with lower education

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ABSTRACT

Objective: To assess the effect of an antismoking intervention focusing on adolescents in lower education. Students with lower education smoke more often and perceive more positive norms, and social pressure to smoke, than higher educated students. An intervention based on peer-group pressure and social influence may therefore be useful to prevent smoking among students.

Design: Group randomised controlled trial.

Setting: 26 Dutch schools that provided junior secondary education.

Subjects: 1444 students in the intervention and 1118 students in the control group, all in the first grade of secondary school, average is age is 13 years.

Intervention: Three lessons on knowledge, attitudes, and social influence, followed by a class agreement not to start or to stop smoking for five months and a class based competition.

Main outcome measures: Comparison of smoking status before and immediately and one year after the intervention, using multilevel analysis.

Results: In the intervention group, 9.6% of non-smokers started to smoke. In the control group, this was 14.2%. This leads to an odds ratio of 0.61 (95% CI= 0.41 to 0.90) to uptake smoking in the intervention group compared with the control group. One year after the intervention, the effect was no longer significant.

Conclusions: In the short-term, an intervention based on peer pressure decreases the proportion of adolescents with lower education who start smoking. Influencing social norms and peer pressure would therefore be a promising strategy in terms of preventing smoking among adolescents. The results also suggest that additional interventions in later years are needed to maintain the effect.

INTRODUCTION

Smoking is one of the most important public health problems. In 1990, it was estimated that in developed countries as a whole tobacco was responsible for 24% of all male deaths and 7% of all female deaths.[1] Since the nineteen-seventies, smoking has decreased among adults in the developed countries, but 30% of the Dutch population still smoke.[2] Particularly in Northwest Europe, smoking is more prevalent among adults with a lower education. This also applies to the Netherlands.[3] In view of this higher prevalence of smoking among adults with a lower education, it is not surprising that the percentage of smokers among adolescents with a lower education (43%) is higher than among adolescents with a higher education (25%).[4]

Most smokers start to smoke in their early teens. It is estimated that 50% of adolescents who start to smoke go on smoking for at least 16 to 20 years.[5] A study among twins showed that smoking initiation is mostly influenced by environmental factors.[6] The influence of peers seems to be an important environmental factor in starting to smoke, especially among adolescents with lower education. These adolescents perceive smoking as a way of meeting people. They see more positive norms and perceive more social pressure to smoke than other adolescents.[7;8] Despite this socio-economic gradient, existing interventions are mainly directed at all adolescents, with no discrimination for education. Furthermore, the prevalence of smoking at school is an important determinant of smoking.[9] Reviews to date show there are several strong evidence based characteristics for effective drug prevention programs. The characteristics are: interactive delivery methods; methods based on the "social influence model"; methods focussed on norms, commitment not to use, and intention not to use; methods adding community interventions to school-based interventions; methods using peer leaders; and methods adding life-skills training to social influence programs.[10-12] We, therefore, developed a school-based intervention, which targeted at social influence. The peer pressure component was directed both at resisting the pressure to smoke and at promoting peer pressure not to start smoking. The aim of this study is to determine whether this intervention reduces the percentage of adolescents in lower education who start to smoke.

METHODS

This study consisted of a group randomised controlled trial on the effects of a peer-pressure-based intervention. The local Medical Ethical Committee approved the design of the study.

Participants

Twenty-six schools throughout the Netherlands that provided lower secondary education participated in the study. Only the first grades participated (average age was 13 years). The recruitment of schools and students took place step by step. Firstly, all community health services in the Netherlands (n=54), except three services that participated in another study, were asked to participate in the study and to provide the names of the schools that were probably prepared to participate. Fourteen community

health services provided the names of 48 schools, in total. Secondly, the researchers approached these schools directly. All schools received a brief explanation about the intervention to motivate them to participate in the study. This was just a general explanation of the intervention and of the time investment needed. Eighteen schools were willing to participate. Four other community health services approached the school themselves. They recruited eight schools.

Sample size

A power calculation indicated that 1400 students were needed in both the intervention and the control group to find a difference of 5% in smoking increase: a power of 80%, alpha of 0.05, and an intra-class correlation of smoking behaviour by class of 0.075. We assumed that group pressure on the class level would influence individual outcomes.

Randomisation

We ranked the schools by size and stratified them in use or not use of a frequently used national drug education program[13]: both the intervention and the control schools continued to use this drug prevention program during the time of the intervention. The schools were randomly assigned to either the intervention or the control group. This was done by asking an independent person to toss a coin.

Intervention

The National Institute against Smoking (STIVORO) and the National Institute on Mental Health and Addiction (Trimbos-institute) developed and conducted the intervention. The intervention consisted of three lessons on knowledge, attitudes and social influence, followed by a class agreement not to start smoking or to stop smoking for the next five months. The reason that the period of five months was chosen, was because the intervention had to fit in one school year and that we wanted to measure smoking behaviour directly before and after the intervention. Two extra video lessons on smoking and social influence were available as an optional extra during these five months. Admission to the final competition was restricted to classes that filled out three registration forms on smoking status at the beginning of, halfway through, and at the end of, the agreement period. The registration forms were sent to STIVORO. Admission was also dependent on the class having fewer than 10% smokers after five months. The criterion to establish <10% of class smokers as a cut off point was that the goal should be feasible. Ten percent is 5% less than the mean percentage of smokers among Dutch students in the first grade of secondary education.[4] The final activity of the class was to make a photo expressing the idea of a non-smoking class. There were competition prizes (ranging from 220 to 450 Euro) for 6 classes with less than 10% smokers and a photo best expressing a non-smoking class.

STIVORO and the researchers trained the intervention schools in the use of the intervention and in the procedure of the study activities. After the initial training STIVORO and the Trimbos-institute supported the schools in all activities concerning the intervention. STIVORO and the Trimbos-institute looked at the adherence to the

protocol of the intervention. They collected the registration forms and the pictures. The researchers supported the intervention schools regarding all parts of the evaluation.

Control

During the study, the control group used the drug prevention program they normally gave to their students: seven schools gave the national drug education program. The schools in the control condition were given the option of using the intervention one year later. On forehand, they were not informed of the final contents of the intervention. The researchers trained the control schools and supported them regarding all parts of the evaluation.

Outcomes

Data was obtained by a questionnaire administered immediately before (October 1998) and after the intervention in June 1999, and in June 2000. The data related to smoking status, i.e., smoking behaviour and attitudes towards smoking, perceived social influences, self-efficacy, and intention to remain a non-smoker.[14] In the analyses, "smoking" was defined as all students who experiment with smoking or who smoke weekly or daily. Furthermore, data was obtained about background characteristics: ethnicity of the adolescents and of their mothers and fathers, work and educational of mother and father, religion, age and gender of the adolescent. All questionnaires were anonymous: only the school, date of birth and the first two letters of the student's name were asked in order to be able to link the three questionnaires to single students.

Statistical methods

In the analyses, we employed multi-level techniques to account for the clustering effect among students in classes and schools.[15] We compared the intervention and control groups in terms of the change in the proportion of smokers before and immediately after the intervention and in terms of the proportion of students who took up smoking. The analyses were adjusted for the background characteristics on which the intervention and control group significantly differed. Next, we examined changes in attitudes, social influence, personal efficacy and intention. Finally, to assess the potential effect of selective dropout, we conducted an "intention to treat" analysis on the basis of three assumptions regarding dropouts:

- All drop outs stopped smoking (or stayed non-smokers).
- All drop outs started smoking (or continued to smoke).
- No drop outs changed their smoking behaviour.

RESULTS

Participant flow

2562 adolescents completed the baseline questionnaire: 1444 in the intervention group and 1118 in the control group. The study included one hundred and fifty-four first classes. In the subsequent measurements, a number of students did not fill in their date of birth and the first two letters of their name. This made it impossible to link the baseline measurement to the follow-up measurements. Furthermore, in the last

measurement, three schools dropped out of the study due to difficulties in finding the students again, lack of motivation and illness of the co-ordinator (Figure 1).

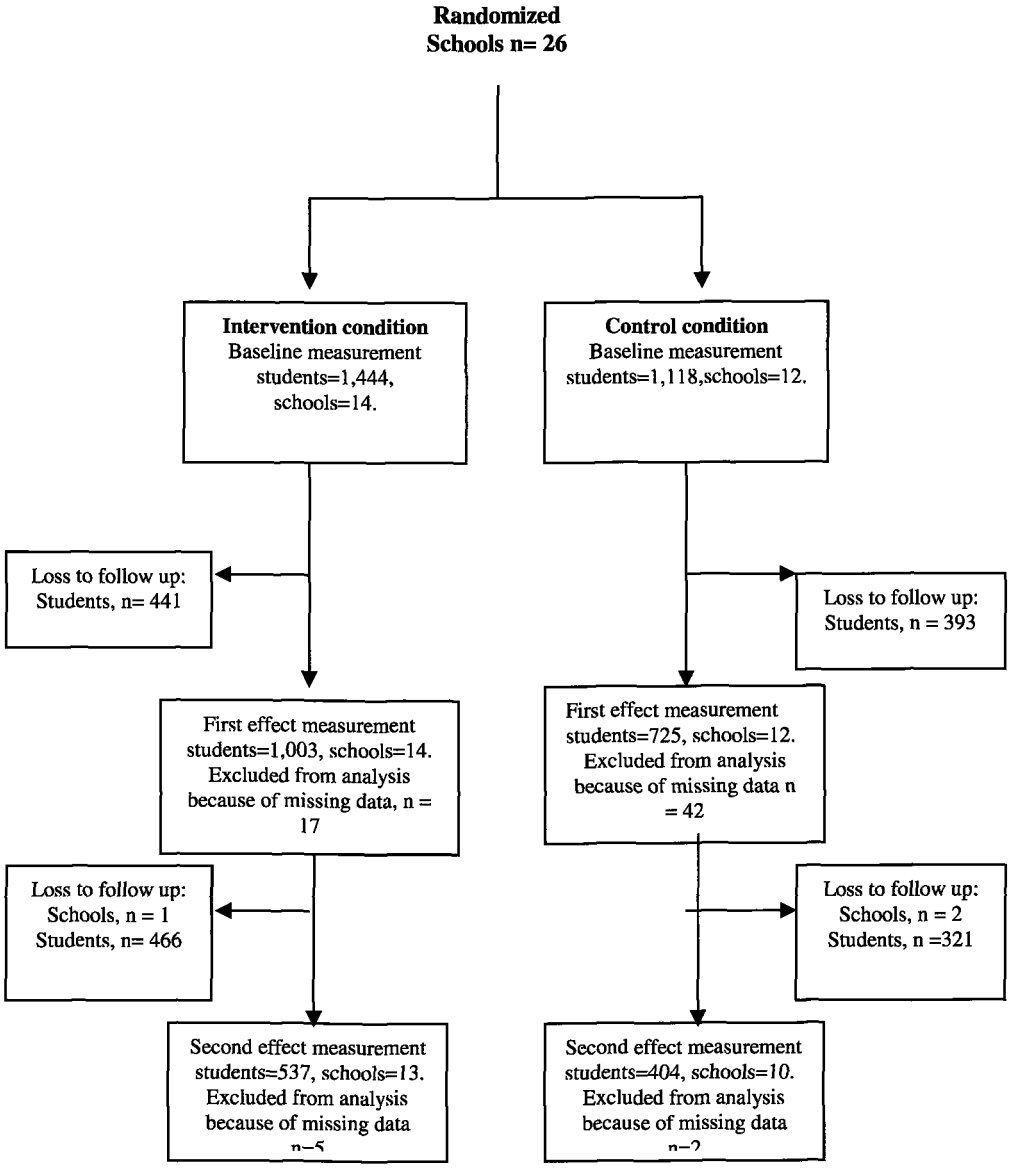

Figure 1: Participant flow and follow-up

Table 1: Characteristics of the intervention and control groups at baseline, and in the response and non-response groups at the first post-test

	Baseline		P*	Response group*		Non-response group		P&
	Intervention n=1444	Control n=1118		Intervention n=1003	Control n=725	Intervention n=441	Control n=393	
# (%) boys	713 (49.5)	677 (60.9)	<0.001	471 (47.0)	423 (58.3)	242 (55.3)	254 (65.6)	ns
Fulltime job			ns					0.006
# (%) yes	1152 (79.8)	866 (77.5)		833 (83.1)	586 (80.8)	319 (72.3)	280 (71.2)	
# (%) no	248 (17.2)	199 (17.8)		165 (16.5)	119 (16.4)	83 (18.8)	82 (20.9)	
# (%) unknown	44 (3.0)	53 (4.7)		5 (0.5)	20 (2.8)	39 (8.8)	33 (8.4)	
Ethnicity			<0.001					0.000
# (%) non-Dutch	150 (10.4)	154 (13.8)		104 (10.4)	76 (10.5)	46 (10.4)	78 (19.8)	
# (%) Dutch # (%)	1252 (86.7)	907 (81.1)		882 (87.9)	608 (83.9)	370 (83.9)	299 (76.2)	
# (%) unknown	42 (2.9)	57 (5.1)		17 (1.7)	41 (5.7)	25 (5.7)	16 (4.1)	
Religion			<0.001					0.000
# (%) Christian	414 (28.7)	241 (21.6)		269 (26.8)	183 (25.2)	145 (32.9)	58 (14.8)	
# (%) non-Christian	117 (8.1)	121 (10.8)		80 (8.1)	61 (8.4)	37 (8.4)	60 (15.3)	
# (%) none	856 (59.3)	682 (61.0)		631 (62.9)	432 (59.6)	225 (51.0)	250 (63.6)	
# (%) unknown	57 (3.9)	74 (6.6)		23 (2.3)	49 (6.8)	34 (7.7)	25 (6.4)	
Age			<0.001					0.043
# (%) 10 to 13 years	641 (44.4)	397 (35.5)		463 (46.3)	326 (45.0)	178 (40.4)	71 (18.1)	
# (%) 13 years	597 (46.1)	576 (51.5)		440 (43.9)	339 (46.8)	225 (51.0)	237 (60.3)	
# (%) 14 years	125 (9.6)	145 (13.0)		90 (10.0)	60 (8.3)	38 (8.6)	85 (21.6)	
Smoking at baseline			ns					0.007
# (%) yes	254 (17.6)	223 (19.9)		172 (17.1)	115 (15.9)	82 (18.6)	108 (27.5)	
# (%) no	1157 (80.1)	852 (76.2)		821 (81.9)	586 (80.8)	336 (76.2)	266 (67.7)	
# (%) unknown (excluded analyses)	33 (2.3)	43 (3.8)		10 (1.0)	24 (3.3)	23 (5.2)	19 (4.8)	

* Chi-square statistics; ns= p >0.05

Differences in baseline characteristics between the intervention and the control group (Chi-square test)

& p-value for differences between the intervention and the control group regarding the distribution of the characteristics in the response group and the non-response group (Chi-square test)

Baseline

Table 1 presents the baseline data for the intervention and control groups and the data for the non-response and response groups in the first follow-up measurement. At baseline, there were significant differences between the intervention and control groups. In particular, the percentage of boys in the control group was higher than in the intervention group. The non-response group at the first follow-up measurement differed statistically significantly from the response group regarding smoking. Non-response was higher among the smokers, especially in the controlgroup.

Short-term effect on the percentage of smokers

The percentage of students who smoked at least one cigarette a week increased less in the intervention group than in the control group. In the intervention group also, more adolescents stopped smoking after having experimented (Table 2).

Table 2: Percentages of smokers, former smokers and students with no smoking history at baseline and at the first follow-up measurement (only students with data regarding baseline and first follow-up measurement)#

	Intervention n=986		Control n=683	
	Baseline	Follow-up measurement 1*	Baseline	Follow-up measurement 1*
Smokes at least once a week	9.3%	12.4%	9.7%	15.4%
Smokes less than once a week	1.8%	1.0%	1.0%	2.2%
Experiments with smoking	6.1%	6.4%	5.6%	6.6%
Has smoked but quit	2.8%	2.0%	3.4%	3.4%
Has experiment with smoking, but does not smoke anymore	27.4%	34.6%	32.5%	34.4%
Has never smoked	52.5%	43.6%	47.9%	38.1%

* Since the person to person relation between baseline and follow-up measurement are not presented in this table, it is not possible to calculate the students that took up smoking or quit smoking at the first follow-up measurement.

The smokers consist of the categories: smokes at least once a week and less than once a week and experiments with smoking. The non-smokers consist of the categories: has quit, has experiment but does not anymore, and has never smoked.

After the intervention, the proportion of smokers had increased significantly less in the intervention group than in the control group (2.6% and 7.9%, respectively). The odds ratio (OR) for being a smoker in the first follow-up measurement was 0.62 (95% confidence interval (CI)= 0.43-0.90) for students in the intervention group compared to the students in the control group (Table 3). After adjustment for demographic variables, the OR hardly changes. However, this adjustment does explain some of the clustering at school level (indicated by a smaller random effect at this level) (Table 3).

Table 3: Odds ratio of smoking[&] in the intervention group versus the control group at the first follow-up measurement, adjusted for smoking at baseline; obtained by multilevel logistic regression (n=1669)

	Unadjusted OR	95% CI	Adjusted OR*	95% CI
Smoking				
Control group	1.00		1.00	
Intervention group	0.60	0.40 – 0.91	0.62	0.43 – 0.90
Random variance[#]	Variance	95% CI	Variance	95% CI
School level	0.109	-0.06 – 0.28	0.028	-0.09 – 0.14
Class level	0.131	-0.08 – 0.34	0.140	-0.07 – 0.35
Individual level	0.959	0.89 – 1.03	0.975	0.91 – 1.04

[&] Smoking is defined as all students who experiment with smoking or who smoke daily or weekly.
*Adjusted for the following factors: ethnicity, age, religion and gender (all three at the class and individual levels). At school level, the size of the school was included. OR= odds ratio; CI= confidence interval.
In multilevel logistic regression, random variance on the school and class levels represents the relation of the explained variance between the two levels. These variances cannot be compared with the random variance at the individual level due to the error estimate included in the latter variance.

Short-term effect on the percentage of students taking up smoking: We examined separately the effect of the intervention among students who did not smoke at baseline. Among these non-smokers, the proportion of smokers increased less in the intervention group (9.6%) than in the control group (14.2%); adjusted OR=0.61 (95% CI= 0.41-0.90) (Table 4). Here again, demographic differences between the groups of students explained some of the clustering at the school level, but not at the class level (Table 4).

*Table 4: Odds ratio of students taking up smoking[&] in the intervention group versus the control group at the first follow-up measurement, adjusted for smoking at baseline; obtained by multilevel logistic regression (n=1388)^*

	Unadjusted OR	95% CI	Adjusted OR*	95% CI
Started to smoke				
Control group	1.00		1.00	
Intervention group	0.60	0.39 – 0.90	0.61	0.41 - 0.90
Random variance[#]	Variance	95%CI	Variance	95%CI
School level	0.063	-0.10 – 0.23	0.016	-0.11 – 0.15
Class level	0.205	-0.06 – 0.47	0.204	-0.05 – 0.46
Individual level	0.944	0.87 – 1.01	0.955	0.88 – 1.03

[&] Smoking is defined as all students who experiment with smoking or who smoke daily or weekly
^The 'n' is lower than in the total study population while it only concerned the students that did not smoke at the first measurement
*Adjusted for the following factors: ethnicity, age, religion and gender (all three at the class and individual levels). At school level, the size of the school was included. OR= odds ratio; CI= confidence interval.
In multilevel logistic regression, random variance on the school and class levels represents the relation of the explained variance between the two levels. These variances cannot be compared with the random variance at the individual level due to the error estimate included in the latter variance.

Additional effect of the video
We compared the adolescents in the intervention group who had seen the video with the ones who had not. Thirty one percent of the students said that they had seen the video. There was no difference in the percentage smokers between the intervention group with and without the video. In both groups the percentage smokers increased with 3%, while in the control group it increased with 8%.

Short-term effect on the determinants of smoking
We found a significant difference between the intervention and the control group regarding the change in social pressure of classmates (β=0.42; 95% CI=0.05-0.79). The perceived social pressure from classmates to smoke decreased in the intervention group while it increased in the control group, meaning that in the latter the classmates were perceived as becoming more positive towards smoking. This suggests that the variable social pressure of classmates has a mediating effect on smoking. To confirm this mediating effect, we also analysed the relationship between the change in this variable and the change in smoking behaviour. For this aim, we divided the change in social pressure between baseline and first follow-up measurement into three categories: more social pressure, equal social pressure, and less pressure from classmates to smoke at the follow-up measurement. There was a significant association between the change in smoking behaviour and the change in the mediating factor. The students that perceived an increase in social pressure from classmates to smoke were more likely to be smokers at the first follow-up measurement, than students perceiving equal social pressure or less social pressure: OR =2.21; 95% CI=1.53-3.18. There were no changes in attitudes or in self-efficacy of the students.

Long-term effect on the percentage of smokers
Among the students, who completed all three questionnaires, 15% of both the intervention and the control groups smoked at baseline. Immediately, and one year after, the intervention, these figures were 17% and 25% respectively for the intervention group, and 23% and 29% respectively for the control group. After one year, the difference between the intervention and control group was no longer significant.

Intention-to-treat analysis
Loss to follow-up was relatively high. We examined its impact in an intention-to-treat analysis, using three scenarios; all dropouts started smoking, stopped smoking, or did not change their smoking behaviour (Table 5). The results mostly indicate that the effects were stable, meaning a short-term effect but not a long-term effect. This was not the case when it was assumed that all of the dropouts stopped smoking. Here, the short-term differences lost statistical significance.

DISCUSSION

This study examined the effect of an intervention based on peer group pressure to prevent smoking uptake among students with lower education. Results show a favourable effect in the short-term. Attitudes and self-efficacy did not change, but the perceived subjective norm of classmates did. Classmates disapproved of smoking more often. This strongly suggests that the intervention worked by increasing peer pressure not to smoke. However, at one-year follow-up, the effect became smaller and was no longer significant.

Until now, there was no evidence on the effect of direct group pressure as a factor in preventing smoking among adolescents with lower education. Previous Dutch and Finnish studies among adolescents with higher education showed similar positive effects.[13,16] However, these studies focussed on dealing with social influence rather than on using peer pressure to prevent smoking.

We could not measure the "incentive effect" of the competition prize. In the planning of the study we have explicitly chosen not to control for it while a previous study showed that offering a prize to only a part of the intervention group would cause many practical problems. This previous study comprised a control group, an intervention group with incentive and an intervention group without incentive. However, the intervention group without incentive found out that the other group received a prize and they started a lawsuit to also obtain this prize.[17] We therefore decided not to control for the incentive effect.

Methodological considerations

The schools were randomly assigned to the intervention and control group in order to reduce the chance of selection bias. In spite of the randomisation procedure, there were differences between the two groups at baseline, especially regarding gender. Chance confounding due to randomisation at school level may explain these differences, and we adjusted for them in our analysis.

Loss to follow-up was somewhat selective but seemed to have a limited effect on the results. Especially in the control group, non-response was higher among the smokers. It is, however, highly unlikely that in this group a higher percentage of students stopped smoking than in the intervention group. The effect of the intervention in the short-term has therefore most probably been underestimated. Due to the large number of non-responders in the second follow-up, it was not possible to calculate the exact effect of the intervention at the second follow-up. This means that uncertainty remains regarding the long-term effect.

Table 5: Percentage of smokers and effects of the intervention according to the different assumptions about smoking behaviour of the dropouts

	% smokers, assuming that all dropouts smoke			% smokers, assuming that all dropouts do not smoke			% smokers, assuming that all dropouts did not change smoking behaviour		
	Intervention N=1411	Control N=1075	OR (95% CI)	Intervention N=1411	Control N=1075	OR (95% CI)	Intervention N=1411	Control N=1075	OR (95% CI)
Baseline	18.0%	20.7%		18.0%	20.7%		18.0%	20.7%	
Follow-up measurement 1	44.8%	52.2%	0.74 (0.62-0.87)	13.7%	15.3%	0.95 (0.74 – 1.21)	19.9%	25.8%	0.63 (0.48-0.83)
Follow-up measurement 2	66.3%	67.1%	1.01 (0.85-1.20)	12.5%	12.9%	0.73 (0.75-1.22)	23.9%	26.7%	0.91 (0.70-1.18)

OR= odds ratio; CI= confidence interval.

All measurements were self-reports, meaning that information bias could have occurred, especially in the intervention group. To prevent this bias, registration for the competition was conducted independently of the evaluation. Moreover, the jury of the competition was not informed about the results of the evaluation, and all students were explicitly informed of this. Another way of avoiding information bias would be to use biological objective measures like cotinine assays. We chose not to do so because most children of this age do not smoke daily. This makes cotinine measurements very unstable. Cotinine can only be detected if smoking or passive smoking occurs in the preceding two days.[18;19] Another reason was that we wanted to study peer pressure and we did not want to generate interference by introducing biological measures as an additional pressure.

Implications

Our class-level intervention has been shown to have a significant and substantial effect on smoking uptake in the short-term, justifying its further implementation in schools in lower education levels. The intervention should, however, be extended to the following school years. This confirms the results of a previous Dutch study,[20] showing that booster interventions can reinforce the effects of smoking prevention activities. Besides boosters, strong evidence-based characteristics for effective school-based drug prevention, like adding community interventions to school-based interventions, using peer leaders, and adding life-skills training to social influence programs could be used to maintain the effect of the intervention in the long-term. But, as the students get older, it is also important to focus on students already experimenting with smoking and on smoking cessation. Another possibility could be to focus more on a comprehensive approach, meaning that health promotion interventions at school focus on cognitive and social outcomes, rather than only on the achievement of specific behavioural outcomes.[21]

Finally, school programs that specifically aim at increasing peer-group pressure not to smoke can reduce smoking uptake by adolescents in lower education. This can be done by getting students to enter into a collective agreement not to smoke and by encouraging competition between classes or schools to keep off cigarettes for some defined time period.

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CHAPTER 8

Discussion

The aim of the research described in this thesis was to provide evidence for the development of education programs for preventing passive smoking among children. These education programs were developed using the model for systematic health education.[1] This final chapter provides a summary of the results of the different steps. It starts with answers to the research questions before turning to methodological aspects of the various studies as performed and concluding with a presentation of the implications for future research, health professionals and health education policy.

RESEARCH FINDINGS

This section summarises the answers to the research questions of this thesis. The answers were derived from five empirical studies and one literature review conducted between 1995 and 2001 that assessed the health consequences of passive smoking among children, followed by the assessment of the prevalence of passive smoking, the conditions for systematic education in well-baby clinics and the determinants influencing smoking in presence of young children. The effect of the two education programs was then studied. Finally, an assessment was made of the implementation and continuation of use of one of these two programs.

Health consequences (chapter 1)

Existing studies provide clear evidence of an association between passive smoking in childhood and several adverse health conditions. The main health consequences are the risk of respiratory illnesses, asthma, SIDS, and ear infections. The literature also provides some evidence for other adverse health outcomes, like cancer, cardiovascular disease, excessive infant crying, and meningococcal disease.. There is some evidence indicating an increased risk of behavioural problems. Finally, children with parents who smoke are more likely to start smoking in the future, especially when parents have not implemented home smoking bans.

Prevalence of passive smoking before systematic education (chapter 2)

In 1996, 24% of mothers and 33% of their partners smoked. In 44% of households, one or more persons smoked. Twenty-two percent of the mothers and 26% of the partners smoked at home; in 39% of the households, one or both parents smoked at home. Forty-two percent of the babies were exposed to tobacco smoke in the living room, 8% were exposed in the car, and 4% during feeding. In cases where only the mother smoked, 13% of the infants were exposed to tobacco smoke during feeding. When the mother smoked, 72% of children were exposed to tobacco smoke in the living room.

Conditions for systematic education at well-baby clinics (chapter 3)

In the mid-nineties, before the development of the education program 'Smoking? Not in presence of the little one', a majority of both managers and child health professionals indicated that they seldom provided information on passive smoking in infancy. However, a majority thought that this was a task for the well-baby clinics and also wanted to pay attention to passive smoking. The health professionals had doubts

about their educational skills with respect to passive smoking. Shortages of time and education material were perceived as barriers to providing education.

Factors influencing smoking in the presence of children (chapter 4)
In 1996, sixty-five percent of the mothers said that they prevented passive smoking by their child. This figure was 55% for smokers and 69% for non-smokers. Parental attitude was the most important factor explaining preventive behaviour among both smokers and non-smokers. Among the respondents, a lack of prevention of passive smoking was significantly associated with a negative attitude, negative social influence exerted by their partner, lower self-efficacy in reducing passive smoking, and increasing age of the child. Finally, a lack of prevention was associated with a low self-efficacy of non-smoking mother in asking others not to smoke.

Effect of systematic education on passive smoking (chapter 5)
The factors that were shown to be associated with smoking in presence of the child were used in the development of a systematic education program to prevent passive smoking among children. The program consists of a booklet for parents and a manual for health professionals. The manual sets out a five-step procedure for addressing passive smoking. In 1999, two years after the dissemination of this education program in the well-baby clinics, the nation-wide prevalence of passive infant smoking had decreased from 41% to 18%.

Implementation and continuation of use of the education program for passive smoking (chapter 6)
Three years after its distribution, 69% of all physicians and nurses used the program. Thirty-three percent of physicians and 82% of nurses gave information to parents using at least some steps of the five-step procedure of the program, although not always all five. The physicians/nurses reported lower scores for institutionalisation than the managers of their organisations. Among physicians, completeness of use is related to whether they consider themselves responsible for discussing passive smoking. Among nurses, it is associated with self-efficacy regarding using the program, perceived responsibility for providing the education, attendance of the training, perceived personal advantages of using the program and with the perceived institutionalisation of the program in the production subsystem.

The effect of an education program for preventing the uptake of smoking (chapter 7)
In 1998, an education program based on peer pressure was developed to prevent the uptake of smoking among adolescents. This education is directed, in particular, at children with lower educational levels since they are more susceptible to start smoking early and to smoke for a long time. When they are older, they also smoke more often during and after pregnancy. The effect of the intervention was assessed in a randomised controlled trial. The effect evaluation indicates that this intervention based on peer pressure results in a significant short-term reduction of the proportion of

adolescents with lower education who start smoking. The results also suggest that additional educational activities in subsequent years are needed to sustain the effect in the long-term.

METHODOLOGICAL CONSIDERATIONS

Most methodological problems have already been discussed in the preceding chapters. The main ones will be elaborated further below.

Self-reporting versus biomarkers

One of the aspects of the studies as described in this thesis is that no biomarkers were used for the assessment of passive smoking or active smoking. We used self-reported smoking in the presence of the child and self-reported active smoking as outcome measures. This might have produced some bias in our results. However, the same holds for the so-called objective measures of passive and active smoking. A review of the errors in all measures for passive infant smoking is given by Hovell et al.[2] They point out that: "the consistency in direction of these associations across independent studies is reassuring and suggests that reported measures can be satisfactory indicators of exposure. This conclusion is bolstered by the observation that relationships between reported measures and biological indicators are about the same as between biological and environmental measures". Moreover, the studies described in chapter 5 and chapter 7 deal with a similar measurement before and after an intervention. Even if imperfect, this measurement will only yield biased results about the effect of the intervention if measurement errors before and after the intervention are different. We have no evidence that this is the case.

A strong argument against the use of biological measures is that they are difficult to implement and very expensive. An even stronger argument against their use is that biological measures have an independent effect on the prevalence of passive and active smoking (parents and adolescents are very aware of such measurements). Finally, objective measures such as cotinine levels also produce errors. For example, in a study in 1997 we used cotinine measurement in saliva to assess passive smoking in infancy.[3] The cotinine measurement had to be a simple method for use during consultations at well-baby clinics. Two samples of saliva from every child were taken in one measurement; the mean difference between the outcomes of these two measurements was 25%. Valid results were therefore impossible. Current methods for measuring cotinine may be better, but even then they are subject to error, as has been shown in a recent study.[4] This study found a variation in the concentration of serum cotinine of 22%, despite consistent self-reported smoking habits throughout the study. The author indicates that this may be attributed to individual biological variation in the relatively small study sample. According to the author, only substantial changes in smoking behaviour can be detected using biochemical assay. However, both serum and urine cotinine analysis can be used to confirm smoking and non-smoking. This means that smokers can be detected with cotinine assays, but that it is not possible to detect changes in the number of cigarettes smoked a day or the number of cigarettes a day people are exposed to.[4]

We therefore think that self-reported smoking is a satisfactory measure for assessing the effects of the interventions.

The design of the effect evaluation

Another methodological aspect is the design of the effect evaluation of the education program 'Smoking? Not in presence of the little one' (chapter 5). By contrast to the evaluation presented in chapter 7, this was not a randomised controlled trial. In 1997, however, we carried out a controlled trial to assess the effect of 'Smoking? Not in presence of the little one' in a small sample of well-baby clinics. This trial is not reported on in this thesis. After the intervention, the intervention group was more aware of passive smoking and subsequently ventilated more indoors than the control group. Although there was a positive change in attitude, the effect size compared to the control group was very small. We had expected a larger change in smoking behaviour in presence of the child. However, in both the intervention and control groups, there was less smoking in the presence of the child one month after birth. To find an explanation for this result, the nurses participating in the study, both in the intervention and in the control groups, were asked about the information they provided to parents about passive smoking during the study. The results showed that the control group was contaminated by the study. Half of the nurses in the control group indicated that, because of the study, they provided more information on passive smoking to parents than before the study.[3]

The lack of effect could also have been caused by the measurement method used. This initially consisted of self-reports and cotinine measurement in saliva. The parents had to be informed about, and give consent for, this cotinine measurement prior to the study and this may have affected their smoking behaviour. A similar effect has also been observed by Hovell et al..[5] In the effect evaluation of the intervention for preventing the uptake of smoking among adolescents, we did not measure cotinine because of the expectation of intrinsic measurement bias.

These considerations confirm that an experimental design is difficult to implement in effect evaluations of health education programs. It often runs counter to the established processes in health promotion relating to participation in decision-making. Furthermore, in community- and population-based studies, there is the problem of contamination of the control group.[6;7;29;30] Despite these problems, some studies have successfully employed an experimental design. Most of them are narrowly defined, i.e. restricted to one health behaviour issue, and have been performed in highly manageable, 'closed' systems such as schools. The randomised controlled trial as described in chapter 7 is a good example of the successful use of an experimental design. However, even in this case it was difficult to implement, as is illustrated by the large number of drop-outs in the last measurement. The conclusion of Nutbeam (1998) in his paper on evaluating health promotion is therefore important for the future development of an evaluation design for health promotion. He concludes that: "In the future, it is important to foster and develop feasible evaluation designs which combine different research methodologies, quantitative with qualitative. The generation and use of a diverse range of data and information sources will generally provide more

illuminating, relevant and sensitive evidence of effects than a single 'definitive' study".[6] In 2001, the World Health Organisation published a book on the subject of evaluation in health promotion. In this book the principles and perspectives of evaluation in this field are discussed and it concludes, for one, that a wider range of research designs should be developed and used in health promotion.[29]

Conclusions and implications

The following conclusions can be drawn from the studies conducted in the framework of this thesis:

- The education program 'Smoking? Not in presence of the little one' for preventing passive smoking has been successful in preventing passive smoking among young children. It can therefore be concluded that an education program that is developed systematically and jointly with key persons from well-baby clinics and based on research can reduce passive smoking among children.
- The Smoke-Free Class Competition, an education program based on peer pressure to refrain from smoking has been effective in decreasing the uptake of smoking among adolescents with lower educational levels. Classmates disapproved of smoking more often. This strongly suggests that the intervention worked by increasing peer pressure not to smoke.
- The effects of both the prevention of passive smoking during childhood and the prevention of the uptake of smoking by adolescents decrease if there is no follow-up to the initial program.
- The initial implementation of the education program to prevent passive smoking among children has been successful. A majority of the nurses in the Dutch well-baby clinics use the education program. The program is, however, not yet properly institutionalised in the well-baby clinics and is not a part of the standard part of the Basic Tasks for Preventive Child Health Care implemented in 2003.

These conclusions lead to several implications for health professionals, health policy-makers, and researchers.

IMPLICATIONS FOR HEALTH PROFESSIONALS

The implications for health professionals differ for those working in preventive health care and in curative health care.

Preventive health care

The implications relate, in particular, to preventive child health care for children (0-4 years old) and adolescents (10 years and older). Health professionals in the well-baby clinics should continue to provide systematic education on the prevention of passive smoking for all parents. In addition, they should pay more attention to households with two parents that smoke, with lower socio-economic status and with immigrant parents. They should not limit education to parents with a newly-born child but should elaborate or repeat it for parents with older children.

The Smoke-Free Class Competition was effective in preventing the uptake of smoking. Community health services should therefore promote the use of this competition in schools, and provide support for secondary schools with the implementation of the intervention as a part of healthy school policies and smoke-free school policies.

Curative health care

Health professionals in curative health care can identify groups of children at high risk for the consequences of passive and active smoking. Parents of a child with health problems that may be caused or aggravated by exposure to tobacco smoke are an important group for preventive activities. The same holds for the prevention of the uptake of active smoking among adolescents with similar risks. The education program should therefore also be disseminated, adopted and implemented among health professionals working in curative health care and not be limited to preventive health care.[8]

HEALTH POLICY IMPLICATIONS

The policy implications described in this section cover three aspects: sustainability, hard-to-reach groups, and implementation and continuation of use.

Sustainability

Both interventions show that the prevention of passive smoking and active smoking can be successful, but that it is hard to sustain this effect in the long-term. A health education cycle should therefore be developed. This cycle should generate continuous attention for active and passive smoking among children. It should start with the prevention of the uptake of smoking by adolescents, followed by preconception advice to stop smoking, then education during pregnancy to prevent the exposure of the unborn child to tobacco smoke, and subsequently relapse prevention. The final step in the cycle is the prevention of passive smoking among the children of persons that have undergone the entire cycle themselves (see Figure 1).

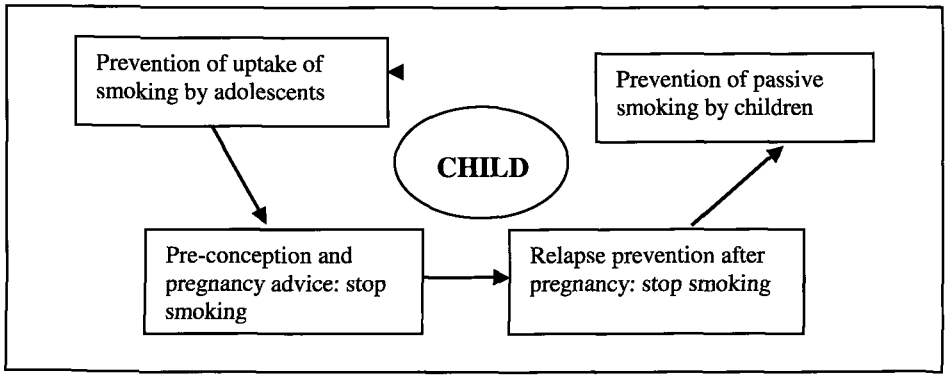

Figure 1: The health education cycle for the prevention of health problems caused by passive smoking in children

Preventing smoking uptake
The prevention of smoking uptake can be based on the peer-group pressure intervention evaluated in this thesis. This education should, however, be elaborated with other activities, as explained in chapter 7. In the last three years (1999, 2000, 2001), this Smoke-Free Class Competition was already disseminated nationally. In 2002/2003, 271 secondary schools (1711 classes), representing approximately 15% of all secondary schools in the Netherlands, participated in this Smoke-Free Class Competition. The development of activities to sustain the effect after the first year has also started. One measure was the elaboration of the competition for the second year of secondary education. Policy-makers, however, should invest more in the development of other effective activities to sustain the effect that has been achieved with the Smoke-Free Class Competition.

Cessation of smoking during pregnancy
The cessation of smoking during pregnancy could be addressed by the Minimal Intervention Strategy for midwives evaluated by Bakker.[9] This intervention consists of a protocol for midwives to address smoking during pregnancy, a video for encouraging pregnant smokers to stop smoking, a self-help guide, a post-delivery booklet to prevent relapse and a booklet for the smoking partner. The study of Bakker et al. conducted in 1995 and 1996 showed that this program had positive results during pregnancy but no effect on post-delivery relapse prevention.[9] The main preventive consequences therefore relate to the unborn child. The national dissemination of this Minimal Intervention Strategy for midwives started in 2002. Policy-makers should promote the use of this Minimal Intervention Strategy among midwives and make it a standard part of their health education tasks.
In 2001, the Dutch Cancer Society started a national campaign called "Children? Then stop smoking" to encourage women to stop smoking before becoming pregnant (if they have a wish to become pregnant). In 2003, this campaign consists of posters and a booklet for future parents distributed via general practitioners, pharmacies and midwives, advertisements in women's magazines, radio commercials, and information on several websites. The effects of this campaign still have to be assessed.
Alongside this national campaign, some activities will have to be initiated for more personal pre-conception advice for women and their partners. Pre-conception education on smoking should become - together with the advice on periconceptional folic acid intake - a standard component of pre-conception advice and counseling provided by general practitioners.[4:10]

Relapse prevention after pregnancy
Bakker's intervention strategy could also be used to prevent relapse after pregnancy. It will, however, have to be improved and elaborated since, in her study, the relapse prevention booklet was hardly disseminated and subsequently resulted in no effect.[9] Health policy should invest in the development of activities to prevent relapse after pregnancy.

Prevention of passive smoking among children
After relapse prevention in the post-delivery period, preventive activities should focus on the prevention of passive smoking in infants and young children. Parents and visitors who have difficulties in stopping smoking should be educated about how to prevent the exposure of their child to tobacco smoke. The education program 'Smoking? Not in presence of the little one' could be used for that purpose. The program should be disseminated among other health professionals in order to reach risk groups such as children with recurrent/chronic lower respiratory infections. In addition, the program should include some kind of follow-up activities to be provided to the parents when the child gets older. These activities are important to sustain the initial effect of the education program but it is also important to prevent the uptake of smoking among young adolescents. Studies have shown that children from households with smoking restrictions in the home start smoking less often.[11]

Hard-to-reach groups
This health education cycle could also be used to reach for hard-to-reach groups such as parents with lower socio-economic status, immigrants, and households in which both parents smoke. Policy-makers should emphasise the development of educational activities for these groups. A promising method could be to invest in a community-based educational approach to prevent passive and active smoking in communities that have a large proportion of immigrants or persons with a lower socio-economic status.[12] The approach could follow all the phases of the health education cycle mentioned above, but it should be developed to include activities that are adapted to the community concerned. This community-based approach would involve close cooperation between community health centers, general practitioners, midwives, home-care organisations, schools and key persons from the community to decrease active and passive smoking. The Smoke-Free Class Competition was already designed for a hard-to-reach group of adolescents and could easily be integrated in this community approach for preventing the uptake of smoking among adolescents.

Implementation and continuation of use
An important issue in the prevention of passive smoking is the continuation and institutionalisation, after their initial implementation, of the activities in the organisations for preventive child health care. As was mentioned in chapter 6, a majority of the health education programs were not continued. However, continuation should be promoted. The fact that STIVORO already broadcasts the video about passive smoking on TV for one month a year is one way of sustaining the focus on the problem among both health professionals and parents. Another aspect is the change in the layout of the medical file of the child. Since 2002, health professionals working in well-baby clinics are required to ask parents about smoking behaviour in the presence of the child in each regular contact with parents. Before 2002, enquiring about smoking was only included in contacts between health professionals and parents approximately two weeks after birth of the child.[13]

Another essential factor determining the continuation of use is the position of smoking prevention programs in the Package of Basic Tasks for Preventive Child Health Care in the Netherlands that came into effect as of January 2003. Before 2003, child health care for children aged 0 to 4 was separated from child health care for children aged 4 to 19 years. Prior to 2003, pre-school care was financed and organised by national government. School health care, except for the vaccination program, was the responsibility of the municipalities. As of 2003, pre-school preventive child health care will also be directed and financed by municipalities, in the same way as school health care already was. At the same time, central government codified a minimum level of tasks for preventive child health care, known as the Package of Basic Tasks for Preventive Child Health Care (Basistakenpakket Jeugdgezondheidszorg). [14] In the description of those Basic Tasks, a distinction was made between standard tasks and tailor-made tasks. The standard component consists of services that should be provided to all individuals in the target group (children and adolescents from 0 to 19 years old). The tailor-made component consists of services that municipalities can provide at their discretion in accordance with the needs of the individuals in their municipality. So the national government decides on the contents of the standard component and the municipalities decide on the tailor-made component.
In this new approach, a health education program can only be part of the standard component of the Basic Tasks if it has been proven to be effective and efficient. Active and passive smoking are important health problems. Given the results of this thesis, it can be concluded that the prevention of active and passive smoking is effective. And it is also plausible that these prevention programs may be cost-effective, although this area still has to be assessed. These arguments relating to importance and efficacy support the inclusion of the prevention of active and passive smoking in the standard component of the Package of Basic Tasks for Preventive Child Health Care.

In addition to the above activities for the promotion of the continuation of use by health professionals, activities should be undertaken to improve the institutionalisation of the education programs in the organisations that use them. Chapter 6 put forward suggestions for improving the institutionalisation of the education program "Smoking? Not in the presence of the little one". The suggestions consist of the development of a procedure for training new staff in using the program, the allocation of time and/or financial resources for attending necessary training, and the appointment and instruction of people with responsibility in the organisation for directing and monitoring program implementation.
National implementation of the Smoke-Free Class Competition started in 1999 and, since then, the number of schools participating in this competition has increased each year, starting with approximately 100 schools (791 classes) in 1999 and now increasing to 271 schools (1681 classes). To assess the potential problems of schools with the use of the Smoke-Free Class Competition in 2002, qualitative interviews were held in 10 schools that use or have used the Competition. The results of this study have led to some changes in the organisation of the Competition.[15] This kind of monitoring and

evaluation of the use of the Smoke-Free Class Competition should take place regularly to identify implementation problems and encourage continuation of use.

FUTURE RESEARCH

The implications and conclusions of this thesis lead to several suggestions for further research. The main topics for research are listed below.

Health problems

Studies have shown that passive smoking is a clear risk for several health problems. In the case of other health problems, however, it is difficult to separate the effects of maternal smoking during pregnancy from smoking after pregnancy. In the case of some other health problems, the association with passive smoking in childhood is still not sufficiently evidence-based. Examples of health problems of this kind are infantile colic, cardiovascular diseases, meningococcal disease and cancer. Future studies should provide more evidence on the role of passive smoking in these health problems.

Specific groups

Relatively large health gains may be obtained by the prevention of active and passive smoking among hard-to-reach groups. However, more evidence is needed about the best way to reach these groups. Future research should focus on several hard-to-reach groups.

Both parents smoke

The prevention of passive smoking has been effective in the general population. However, 40% of the households with two parents that smoke still have a child exposed to tobacco smoke in the living room. This is approximately 6% of all Dutch households. This is an essential group because the most important source of the exposure of children to environmental tobacco smoke is parental smoking. These parents are most likely to have a lower socio-economic status and are more difficult to reach with standard health promotion messages. Future educational efforts should therefore be directed at this target group. Other studies have already directed effective educational efforts at this specific group of parents.[16;17] These interventions could be used to elaborate the existing education program for this target group.

Immigrant parents

Another risk group consists of the immigrant parents. Prevalence data from the city of Amsterdam indicate that daily smoking at home among the households of Turkish immigrants in the Netherlands is considerably more prevalent (43%) than among Surinamese, Moroccan and Dutch households (26%).[18] A possible reason for this higher prevalence is that smoking prevalence among Turkish men (70%) is generally higher than among Dutch men (43%).[19;20] In Amsterdam, the prevalence of smoking among Turkish mothers is comparable to the prevalence of smoking among Dutch mothers (19% and 22% respectively).[18]

Research should therefore explore further how to reduce the exposure to environmental tobacco smoke among children with these groups of parents.

Children getting older
In the first year of a child's life, a large proportion of parents recognise the importance of the prevention of passive smoking, but this proportion gets smaller when the child gets older. Exposure to environmental tobacco smoke then increases. Health promotion activities on passive smoking should therefore be elaborated, with activities targeting parents with children older than 12 months.
The same process is seen in the prevention of the uptake of smoking among adolescents. The Smoke-Free Class Competition has an effect in the short-term but the effect decreases as students get older. Another Dutch education program on drug abuse, including the subjects of tobacco, alcohol and drugs, has the same effect on smoking. It has a short-term effect on the prevalence of smoking but the effect is no longer present two years after the intervention. [21] These results stress the need for sustained efforts to boost the effect of these interventions.

Parental smoking cessation
The education program 'Smoking? Not in presence of the little one' targets the prevention of the exposure of children to environmental tobacco smoke and it is therefore not directed at stopping smoking. This does not mean that this cessation should not be addressed. The education program could even be the first step in a process in which parents stop smoking. After all, the prevalence of maternal smoking decreased by 4% between 1996 and 1999 (chapter 5). This potential additional effect of the education program should be studied further; particularly given the fact that the earlier parents stop smoking in the life of their offspring, the less likely their children are to start smoking.[22]

Cost effectiveness
Stoddard and Gray (1997), and Aligne and Stoddard (1997) have estimated smoking-attributable health care costs in the United States for asthma and other respiratory conditions. Stoddard estimated these costs on the basis of a sample of 2624 children aged 5 years or younger from the National Medical Expenditure Survey and Aligne on the basis of a literature synthesis that used as its primary source the results of best estimates published previously. Their cost estimates for the United States range from $703 million for all respiratory conditions for children under six to $897 million for a similar set of conditions but a broader age group (0 to 18 year-olds).[23;24] More specifically, Stoddard et al. calculated that children of five years and younger with a mother who smokes need $120 a year more health care than children with a mother who does not smoke. Children younger than 3 years need even $175 more. The same study indicates that passive smoking is associated with $661 million in annual medical expenditure, representing 19% of all expenditure for childhood respiratory conditions.[23]

The WHO conducted an international review on the costs of environmental tobacco smoke. Using the data from Aligne and Stoddard, they calculated that the US costs in 1997 for environmental tobacco smoke were approximately $15 per US child under the age of 15.[25]
These data suggest that even a small decrease in passive smoking among children will affect this expenditure. A decrease in the prevalence of passive infant smoking from 41% to 18%, as was found in this thesis, can be expected to result in a considerable fall in additional expenditure on health care for children. However, the size of this fall and the cost of the intervention, i.e. the cost-effectiveness of such an intervention, have to be established more exactly.

Development of an international instrument for measuring passive smoking
Due to the different methods for measuring passive smoking, it is difficult to compare the prevalence of passive smoking in different studies/countries. The most frequently-used methods for measuring passive smoking are cotinine measurement and/or self-reports. However, the questions used in the self-reports differ between studies. Some studies use parental smoking as an indicator for passive smoking, which is possible when there is evidence that there is no difference between parental smoking and exposure to tobacco smoke. But as education for preventing passive smoking are stimulated and implemented more widely in health care, parental smoking is no longer an adequate indicator for the exposure of children to tobacco smoke. Other studies ask more explicit questions about children's exposure to tobacco smoke, but even then there are differences in the phrasing and definition of the questions.
The results of the cotinine studies are also difficult to compare. Some studies measure cotinine in urine and others measure it in saliva, serum or hair. A study by Jarvis, which assessed the comparability of the cotinine scores, found that serum and saliva are comparable, but different cotinine scores were found in urine.[26] In addition, there is a relatively large variation in intra- and interpersonal measurements of cotinine. [27] A study in 2002 indicated that hair nicotine was a more precise biomarker of exposure to environmental tobacco smoke than urine cotinine levels.[28]
All these different measures make it difficult to compare prevalence data between countries, or even within countries. They also make it impossible to monitor trends in the prevalence of passive smoking over the years. It would already make it easier to compare data if a standard instrument was to be developed for measuring passive smoking, even if it is not possible to standardise studies in terms of the year, regional or national scope, or sampling. The development of an international or European standard for measuring passive smoking is therefore highly desirable.

KEY MESSAGE
The main message of this thesis is that the education programs 'Smoking? Not in presence of the little one' and the Smoke-Free Class Competition have been effective in preventing, respectively, passive smoking and the uptake of active smoking in the short-term. Sustaining these effects, however, requires long-term and systematic efforts. Health professionals, other intermediaries and policy-makers should pay more

attention to the sustainability of the effects of health education. A one-off activity is not sufficient to change smoking behaviour in the long-term. Regular attention and repeating the message are needed to sustain the short-term effects and to obtain the intended health benefits.

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Summary

This thesis deals with the prevention of exposure to tobacco smoke (passive smoking) in infants and young children. 'Exposure to tobacco smoke' means the inhalation of somebody else's smoke and the components it contains. The term includes the exposure of the unborn child to a mother who smokes. However, this specific topic is discussed in another thesis.

The aim of the research described in this thesis was to provide evidence for the development of education programs for preventing passive smoking among young children. This thesis consists of a review of the literature and five cross-sectional studies that were conducted in the period 1995-2001. The studies are based on a simplified model of systematic health education, starting with the problem analysis, followed by the analysis of behaviour and environment, the analysis of determinants, the development of the intervention, and the implementation of the intervention (Figure 1).

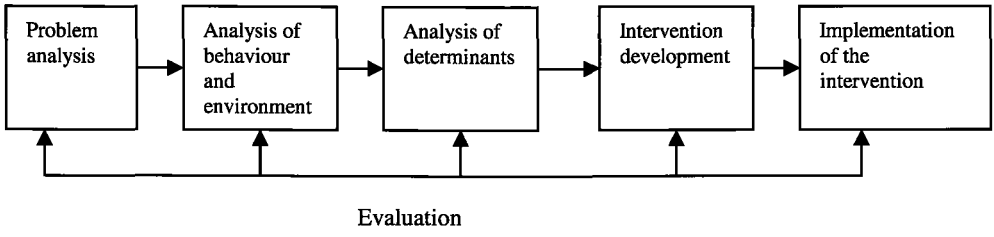


Figure 1: Simplified model of systematic health education.

On the basis of the model, the following questions are answered:

1. What are the health consequences of passive smoking in young children? (problem analysis)
2. What is the prevalence of passive smoking in young children? (analysis of behaviour and environment)
3. What are the best conditions for, and how feasible is, standardised education at well-baby clinics about passive smoking in young children? (analysis of environment)
4. Which factors influence parental smoking or parental approval of smoking in the presence of their child? (analysis of determinants)
5. What is the effect of a systematic education program on passive smoking in children? (intervention development)
6. What is the situation with respect to the continuation of use of this education program at well-baby clinics, and which antecedents affect continuation? (implementation of the intervention)

Besides trying to prevent passive smoking among children, it is also important to prevent active smoking among young people before they become parents. This can lead to a reduction in morbidity caused by passive smoking in childhood for subsequent generations. Therefore an additional aim of this study was to prevent the uptake of

smoking in early adolescence, focusing in particular on adolescents with a lower level of education. This group starts to smoke early in life and is more likely to smoke during and after pregnancy. The research issue here is:

7. What is the effect of an education program for preventing the uptake of smoking among adolescents with a lower level of education? (intervention development)

The first question about the health consequences of passive smoking is answered in chapter 1.
Existing studies provide clear evidence of an association between passive smoking in childhood and several adverse health conditions. Children exposed to environmental tobacco smoke are at a higher risk of lower respiratory infections and ear infections. When children have asthma, their exposure to environmental tobacco smoke increases the frequency and severity of asthma attacks. Exposure to tobacco smoke leads to a higher risk of the sudden infant death syndrome. The literature also provides some evidence for some other adverse health outcomes, namely cancer, cardiovascular diseases, excessive infant crying, and meningococcal disease. There is some evidence indicating an increased risk of behavioural problems. Finally, children with parents who smoke are more likely to start smoking in the future, especially when parents have not implemented home smoking bans.

Chapter 2 presents the prevalence data for passive smoking by children in 1996. At that time, there was no systematic education about passive smoking. In total 1702 parents with children aged 0-14 months completed a questionnaire. Twenty-four percent of mothers and 33% of their partners smoked. In 44% of households, one or more persons smoked. Twenty-two percent of the mothers and 26% of the partners smoked at home; in 39% of the households, one or both parents smoked at home. Forty-two percent of the babies were exposed to tobacco smoke in the living room, 8% were exposed in the car, and 4% during feeding. In households with only one partner that smoked, children were most frequently exposed to tobacco smoke in the car (18%). When the mother smoked, 72% of children were exposed to tobacco smoke in the living room, 12% in the car and 9% during feeding.

Chapter 3 assesses what was done in the well-baby clinic in the mid-nineties to prevent passive smoking by children and also looks at the conditions required for systematic education. Forty-four managers of home-care organisations (which house the well-baby clinics) and 413 physicians and nurses working at the well-baby clinics completed a questionnaire. A majority of both managers and child health professionals indicated that they seldom provided information about passive smoking in infancy. However, 78% of the physicians and nurses thought that this was a task for the well-baby clinics and 95% also wanted to pay attention to passive smoking. The health professionals had doubts about their educational skills with respect to passive smoking. Shortages of time and education material were perceived as barriers to providing education. According to the health professionals, information in the 'groeiboek' was thought to be good support

for the education, as were a video in the waiting room and an information evening for future parents.
The next activity was therefore to identify which determinants have an important effect on parents and which are amenable to outside influence in terms of smoking/allowing smoking in the presence of children.

These determinants are described in chapter 4. In 1996, 1702 parents completed a questionnaire about smoking behaviour, prevention of passive smoking, attitudes, social influence and self-efficacy with respect to the prevention of passive smoking by children. Most questionnaires were completed by mothers (1551). Sixty-five percent of the mothers said that they prevented passive smoking by their child. This figure was 55% for smokers and 69% for non-smokers. Parental attitude was the most important factor explaining preventive behaviour among both smokers and non-smokers. Among the respondents, a lack of prevention of passive smoking was significantly associated with a negative attitude, negative social influence exerted by their partner, lower self-efficacy in reducing passive smoking, and the increasing age of the child. Finally, a lack of prevention was associated with low self-efficacy in non-smoking mothers in terms of asking others not to smoke.
These results indicate that health education for preventing passive smoking by children should be directed at the attitudes and personal efficacy of parents. The education should not be restricted to parents with very young children but should also be given to parents with older children.

The analysis of the problems, behaviour and environment resulted in the development of an education program. The development, implementation and effect of this education program entitled 'Smoking? Not in the presence of the little one' are described in chapter 5. The program consists of a booklet for parents and a manual for health professionals. The manual describes a five-step procedure for health professionals for discussing passive smoking with parents. The main message of the program is that people should not smoke in the presence of a child. The message is not that people should stop smoking. 'Smoking? Not in the presence of the little one' was distributed to all home-care organisations in the Netherlands at the end of 1997. In 1999, an assessment took place to determine whether the percentage of passive smoking children had decreased. A comparison was made between the prevalence of smoking in the presence of infants aged 0–10 months before (1996) and after (1999) the implementation of the education program.
In this period, the prevalence of passive infant smoking decreased from 41% to 18%. The adjusted odds ratio for passive infant smoking in 1999 compared to 1996 was 0.34 (0.26–0.44) when none of the parents smoked, 0.19 (0.14–0.27) when one of the parents smoked, and 0.30 (0.20–0.44) when both parents smoked. The prevalence of passive smoking increased again when the child grew older.

The implementation of a prevention program is only really successful when it continues to be used. Experience has shown that the implementation of an innovation

does not last. Chapter 6 describes the continuation of use of the education program 'Smoking? Not in the presence of the little one' and the factors that influence it. In 2001, 47 managers of home-care organisations and 516 physicians and nurses working at the well-baby clinics completed a questionnaire about the completeness of use, level of institutionalisation, characteristics of the organisation, of the user, of the innovation and of the innovation strategy of the education program.
Three years after its distribution, 69% of all physicians and nurses used the program. Thirty-three percent of physicians and 82% of nurses gave information to parents using at least some steps of the five-step procedure of the program, although not always all five. The physicians/nurses reported lower scores for institutionalisation than the managers of their organisations. Among physicians, completeness of use is related to whether they consider themselves responsible for discussing passive smoking. Among nurses, it is associated with self-efficacy regarding use of the program, perceived responsibility for providing the education, attendance of the training, perceived personal advantages of using the program and with the perceived institutionalisation of the program in the production subsystem.
This study shows that the education program 'Smoking? Not in the presence of the little one' is used frequently by nurses and a little less frequently by physicians. The first three steps of the five-step procedure were used most. Training activities should be aimed at the amelioration of personal efficacy in using the last steps. In addition, the level of institutionalisation within the organisation is essential for the use of the program. This institutionalisation is still limited and should be promoted by, for example, the development of a procedure to train new staff in the use of the program and the allocation of a coordinator within the organisation who guides the implementation and adaptation of the education program.

Chapter 7 evaluates the effect of an intervention to prevent smoking/starting smoking.
In 1998, an education program based on peer pressure was developed to prevent the uptake of smoking among adolescents. This education focused in particular on children with lower educational levels since they have a greater tendency to start smoking early and to smoke for a long time. When they are older, they also smoke more often during and after pregnancy. The intervention consists of three lessons about knowledge, attitudes, and social influence, followed by a class agreement not to start or to stop smoking for five months and a class-based competition. The intervention is based on the European Smoke-Free Class Competition. The classes with 90% of students that did not smoke during these five months could win a prize. The effect of the intervention was assessed in a randomised controlled trial. The same students completed a questionnaire three times on smoking behaviour, attitudes, social influence, personal efficacy and intention to smoke.
The baseline measurement took place before the intervention (November 1998), the first follow-up measurement immediately after the intervention (May 1999) and the last measurement in April 2000.
In the intervention group, 9.6% of non-smokers started to smoke. In the control group, this was 14.2%. This leads to an odds ratio of 0.61 (95% CI= 0.41 to 0.90) for the

uptake of smoking in the intervention group compared to the control group. One year after the intervention, the effect was no longer significant.
These results show that, in the short-term, an intervention based on peer pressure in combination with lessons about smoking decreases the proportion of adolescents with lower education who start smoking. Influencing social norms and peer pressure would therefore be a promising strategy in terms of preventing smoking among adolescents. The results also suggest that additional interventions in later years are needed to maintain the effect.

Chapter 8 provides a short summary of the results, the discussion and the conclusions. The most important conclusions can be summarised as followed:

- The two education programs described in this thesis have been successful in reducing passive and active smoking among young children in the short-term.
- The effects of both the prevention of passive smoking during childhood and the prevention of the uptake of smoking by adolescents decrease if there is no follow-up to the initial program.
- The initial implementation of the education program for preventing passive smoking among children has been successful. A majority of the nurses in the Dutch well-baby clinics use the education program. The program is, however, not yet properly institutionalised in the well-baby clinics and is not a standard part of the Basic Tasks for Preventive Child Health Care implemented in 2003.

These conclusions lead to several implications for health professionals, health policy-makers, and researchers.

For health professionals working in the preventive health care, the most important implications are that they should continue to use the education program 'Smoking? Not in the presence of the little one' and that they should elaborate the education with additional activities for when the child gets older. This can be done by repeating the message during contacts with parents and by means of new education activities. Community health services should promote the use of the education program to prevent the uptake of active smoking in schools, and provide support for secondary schools with the implementation of the intervention as a part of healthy school policies and smoke-free school policies.
In addition to preventive health care, curative health care should also pay more attention to passive smoking, especially in the case of children with health problems which can be caused by environmental exposure to tobacco smoke.

The policy implications mostly relate to the maintenance and sustainability of the effect of the prevention of passive and active smoking by children in the long-term and the continuation of use of the education programs.
Both interventions show that the prevention of passive smoking and active smoking can be successful, but that it is hard to sustain this effect in the long-term. A health

education cycle should therefore be developed. This cycle should generate continuous attention for active and passive smoking among children. It should start with the prevention of the uptake of smoking by adolescents, followed by preconception advice to stop smoking, then education during pregnancy to prevent the exposure of the unborn child to tobacco smoke, and subsequently relapse prevention. The final step in the cycle is the prevention of passive smoking among the children of people that have undergone the entire cycle themselves. Developing a cycle of this kind means that systematic attention is given to smoking. This health education cycle could also be used to reach for hard-to-reach groups such as parents with lower socio-economic status, immigrants, and households in which both parents smoke. A promising method could be to invest in a community-based educational approach for preventing passive and active smoking in communities that have a large proportion of immigrants or persons with a lower socio-economic status.
An essential factor determining the continuation of use is the position of smoking prevention programs in the Package of Basic Tasks for Preventive Child Health Care in the Netherlands. This package was introduced in January 2003. Given the importance for health and the existence of effective prevention programs, it is advisable to include the prevention of smoking and passive smoking among children as a standard component of the Package of Basic Tasks for Preventive Child Health Care.

A final recommendation for health policy relates to the institutionalisation of 'Smoking? Not in the presence of the little one'. The institutionalisation of the education program could be improved by the development of a procedure for training new staff in using the program, the allocation of time and/or financial resources for attending necessary training, and the appointment and instruction of people with responsibility in the organisation for directing and monitoring program implementation.

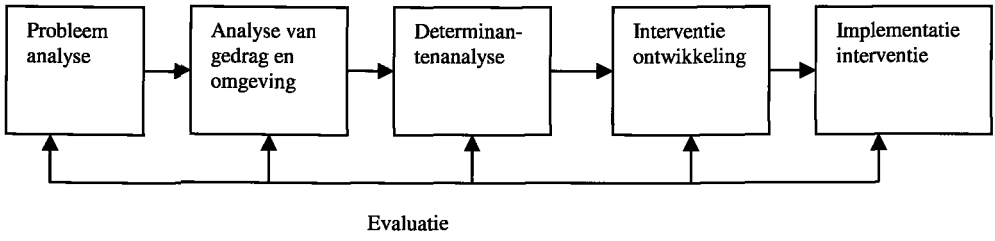
Finally, the implications and conclusions of this thesis lead to several suggestions for further research. The main topics for research are listed below.

- Future studies should provide more evidence about the role of passive smoking in those health problems where data is still lacking.
- The development and evaluation of additional education activities for several hard-to-reach groups, like household with two smoking parents, households with immigrant parents, and older children.
- The development and evaluation of additional activities for adolescents to maintain the effect of the Smoke-Free Class Competition but also of other smoking prevention programs.
- Study on the effect of 'Smoking? Not in the presence of the little one' on smoking cessation by parents.
- Assessment of the cost-effectiveness of these education programs.
- Development of an international instrument for measuring passive smoking among children.

The main message of this thesis is that the education programs 'Smoking? Not in the presence of the little one' and the Smoke-Free Class Competition have been effective in preventing, respectively, passive smoking and the uptake of active smoking in the short-term. Sustaining these effects, however, requires long-term and systematic efforts. Health professionals, other intermediaries and policy-makers should pay more attention to the sustainability of the effects of health education. A one-off activity is not sufficient to change smoking behaviour in the long-term. Regular attention and repeating the message are needed to sustain the short-term effects and to obtain the intended health benefits.

Samenvatting

Dit proefschrift gaat over de preventie van meeroken (passief roken) door kinderen. Onder meeroken wordt het inademen van tabaksrook verstaan en tevens de blootstelling van het ongeboren kind aan een moeder die zelf rookt. In dit proefschrift gaat het vooral om het meeroken van het geboren kind. Het meeroken van het ongeboren kind wordt in een ander proefschrift besproken.
Het doel hierbij is de ontwikkeling van voorlichtingsprogramma's om het meeroken door kinderen te voorkomen. Dit proefschrift bestaat uit een literatuur onderzoek en vijf cross-sectionele onderzoeken die van 1995 tot 2001 uitgevoerd zijn. De onderzoeken zijn gebaseerd op een vereenvoudigd planningsmodel voor de ontwikkeling van gezondheidsbevorderende programma's/ activiteiten, beginnend met de probleemanalyse, vervolgens de gedrags- en omgevingsanalyse, de determinantenanalyse, de interventie ontwikkeling en de implementatie van de interventie.



Figuur 1: model voor planmatige gezondheidsvoorlichting

Op basis van dit model worden de volgende vraagstellingen beantwoord:
1. Wat zijn de gevolgen van meeroken voor de gezondheid van jonge kinderen?
2. Wat is de prevalentie van passief roken door jonge kinderen?
3. Wat zijn de voorwaarden voor en de haalbaarheid van systematische voorlichting op consultatiebureaus over passief roken door jonge kinderen?
4. Welke factoren zijn van invloed op het wel of niet (laten) roken door ouders in het bijzijn van hun kind?
5. Wat is het effect van een systematische voorlichting over passief roken door kinderen?
6. Hoe is de continuering van het gebruik van de voorlichtingsprogramma op consultatiebureaus en welke factoren beïnvloeden deze continuering van gebruik?

Naast de preventie van passief roken is het ook belangrijk om (actief) roken door adolescenten, de toekomstige ouders, te voorkomen. Dit kan leiden tot een vermindering van de morbiditeit veroorzaakt door meeroken in de volgende generaties. Een onderdeel van dit proefschrift is daarom ook gericht op de preventie van het beginnen met roken in de vroege adolescentie. Hierbij is vooral aandacht voor adolescenten met een laag opleidingsniveau, omdat zij eerder beginnen met roken en vaker roken tijdens en na de zwangerschap. De vraagstelling is als volgt:

7. Wat is het effect van een voorlichtingsprogramma om het beginnen met roken bij jongeren met een laag opleidingsniveau te verminderen?

De eerste vraagstelling over de gevolgen van meeroken voor de gezondheid wordt beantwoord in hoofdstuk 1. Uit de literatuur blijkt dat het meeroken door kinderen een risicofactor is voor verschillende gezondheidsproblemen. Kinderen die meeroken hebben een hoger risico op onderste luchtweginfecties en oorontstekingen. Indien kinderen astma hebben, wordt door het meeroken de frequentie en ernst van astma-aanvallen verhoogd. Blootstelling aan tabaksrook leidt tot een verhoogd risico op wiegendood. Voor een aantal (gezondheids)problemen lijkt meeroken een risicofactor te zijn, zoals kanker, hart- en vaatziekten, excessief huilen (huilbaby), en meningokokken infecties. Er lijkt ook een verhoogd risico op gedragsproblemen te zijn. Tenslotte, hebben kinderen met ouders die roken een hogere kans om zelf in de toekomst te roken, vooral als ouders geen huisregels wat betreft roken hebben ingesteld.

In hoofdstuk 2 worden de gegevens over de prevalentie van meeroken door kinderen in 1996 beschreven. Op dat moment bestond er nog geen systematische preventie van meeroken door kinderen. In totaal hebben 1702 ouders met een kind van 1 tot 14 maanden oud hiervoor een vragenlijst ingevuld en teruggestuurd. Vierentwintig procent van de moeders en 33% van hun partners rookte. In 44% van de gezinnen rookte één of meer personen. In 39% van de gezinnen rookte één of beide ouders in huis. Tweeënveertig procent van de kinderen was blootgesteld aan tabaksrook in de woonkamer in de 7 dagen voorafgaand aan het invullen van de vragenlijst, 8% was blootgesteld aan tabaksrook in de auto, en 4% tijdens de voeding. In gezinnen waar alleen de partner rookte, werden de kinderen het vaakst blootgesteld aan tabaksrook in de auto (18%). Indien de moeders rookten, was 72% van de kinderen blootgesteld aan tabaksrook in de woonkamer, 12% in de auto en 9% tijdens de voeding.

In hoofdstuk 3 is gekeken naar wat midden jaren negentig binnen consultatiebureaus werd gedaan aan de preventie van het meeroken van kinderen en wat de voorwaarden voor een systematische voorlichting moeten zijn. Vierenveertig managers van thuiszorgorganisaties, waaronder de consultatiebureaus vallen, en 413 artsen en verpleegkundigen die op de consultatiebureaus werken vulden hiervoor een vragenlijst in. Een meerderheid van zowel de managers als van de verpleegkundigen en artsen gaf aan weinig aan de systematische preventie van meeroken te doen. Van de verpleegkundigen en artsen vond 78% dit wel een taak van het consultatiebureau en 95% wilde er aandacht aan besteden. De consultatiebureaumedewerkers gaven aan zelf te twijfelen over hun vaardigheid met betrekking tot voorlichting geven over roken. Gebrek aan tijd en aan voorlichtingsmateriaal ervoeren ze als een belemmering. Het opnemen van informatie in het groeiboek werd als een goede ondersteuning van de voorlichting gezien, evenals een video die in de wachtkamer en tijdens voorlichtingsbijeenkomsten kan worden gebruikt. Deze resultaten gaven aan dat er zeker mogelijkheden zijn voor een systematische voorlichting aan ouders via de ouder- en kindzorg. De volgende stap is daarom na te gaan welke determinanten van ouders

belangrijk en beïnvloedbaar zijn als het gaat om het wel of niet (laten) roken in het bijzijn van hun kind.

Deze belangrijke en beïnvloedbare determinanten van ouders worden in hoofdstuk 4 beschreven. In 1996 vulden 1702 ouders een vragenlijst in over rookgedrag, preventie van meeroken, attitudes, sociale invloed en eigen effectiviteit ten aanzien van de preventie van meeroken door kinderen. De meeste vragenlijsten (1551) werden door moeders ingevuld. Vijfenzestig procent van deze moeders probeerde het meeroken door hun kind te voorkomen. De attitude van de moeders ten aanzien van de preventie van meeroken verklaarde het beste het preventief gedrag van de moeder. Een gebrek aan preventie van meeroken was significant geassocieerd met een negatieve attitude, een negatieve invloed van de partner, een lage eigen effectiviteit om het meeroken in het algemeen te voorkomen en een oudere leeftijd van het kind. Tenslotte, hing gebrek aan preventie samen met een lage eigen effectiviteit van vooral niet-rokende moeders om anderen te vragen om niet te roken. Deze resultaten wijzen erop dat gezondheidsvoorlichting ter preventie van meeroken door kinderen zich moet richten op de attitude en de eigen effectiviteit van ouders. Tevens moet de voorlichting zich niet beperken tot ouders van jonge kinderen maar ook gegeven worden aan ouders met oudere kinderen.

De probleemanalyse, de gedrags- en omgevingsanalyse en de determinantenanalyse hebben vervolgens geleid tot het ontwikkelen van een voorlichtingsprogramma. De ontwikkeling, de implementatie en het effect van dit voorlichtingsprogramma getiteld 'Roken? Niet waar de kleine bij is' wordt in hoofdstuk 5 beschreven. Het programma bestaat uit een brochure voor ouders en een handleiding voor zorgverleners. In de handleiding wordt een vijfstappenplan beschreven waarmee zorgverleners het meeroken met ouders kunnen bespreken. De belangrijkste boodschap van dit programma is het niet roken in bijzijn van het kind, niet om perse te stoppen met roken. 'Roken? Niet waar de kleine bij is' is eind 1997 verspreid onder alle thuiszorgorganisaties in Nederland. In 1999 is vervolgens gekeken of twee jaar na de disseminatie het percentage kinderen dat meerookt veranderd is. Hiervoor is de blootstelling van kinderen van 0 tot 10 maanden aan tabaksrook in de woonkamer in 1999 vergeleken met de blootstelling van kinderen in diezelfde leeftijdsgroep in 1996. In deze periode bleek de prevalentie van de blootstelling aan tabaksrook gedaald te zijn van 41% naar 18%. De gecorrigeerde odds ratio voor blootstelling aan tabaksrook in 1999 vergeleken met 1996 was 0,34 (95% betrouwbaarheidinterval (BI)= 0,26–0,44) indien geen van de ouders rookte, 0,19 (95% BI=0,14–0,27) indien een van de ouders rookte, en 0,30 (95% BI=0,20–0,44) indien beide ouders rookten. De prevalentie van het meeroken werd weer hoger bij oudere kinderen.

De invoering van een preventieprogramma is pas echt een succes als het gebruik van het voorlichtingsprogramma gecontinueerd wordt. De ervaring leert namelijk dat de implementatie van een vernieuwing vaak niet blijvend is. Hoofdstuk 6 beschrijft de continuering van gebruik van het voorlichtingsprogramma 'Roken? Niet waar de kleine

bij is' en de factoren die daar van invloed op zijn. Hiervoor vulden 47 managers van thuiszorgorganisaties en 516 artsen en verpleegkundigen werkzaam op het consultatiebureau in 2001 een vragenlijst in over mate van gebruik, mate van inbedding en kenmerken van de organisatie, gebruiker, voorlichtingsprogramma en invoeringsstrategie van het voorlichtingsprogramma. Negenenzestig procent van de artsen en verpleegkundigen gebruikte het programma; van de gebruikende artsen gaf 33% mondelinge informatie aan ouders volgens het vijfstappenplan. Van de gebruikende verpleegkundigen was dit 82%. De mate van gebruik door artsen hangt samen met de mate waarin hij of zij zich verantwoordelijk voelt om passief roken door kinderen met ouders te bespreken. Het gebruik van verpleegkundigen hangt samen met de mate van inbedding van het programma in het reguliere zorgproces, eigen effectiviteit in het gebruik van het programma, verantwoordelijkheid, bijwonen van de training en persoonlijke voordelen van het gebruik van het voorlichtingsprogramma. Uit dit onderzoek blijkt dat het voorlichtingsprogramma 'Roken? Niet waar de kleine bij is' veel gebruikt wordt door de verpleegkundigen en in mindere mate door de artsen. Vooral de eerste drie stappen van het stappenplan worden gebruikt. Trainingsactiviteiten zouden zich moeten richten op het verbeteren van de eigen effectiviteit en op het gebruik van de laatste twee stappen. Daarnaast is de mate van inbedding binnen de organisatie van belang voor het gebruik. Deze inbedding is nog beperkt en moet daarom bevorderd worden, bijvoorbeeld door het ontwikkelen van een procedure voor het inwerken van nieuwe werknemers en het instellen van een coördinator binnen de organisatie die de invoering en uitvoering van het programma begeleidt.

In hoofdstuk 7 wordt het effect van een interventie ter preventie van het (beginnen met) roken geëvalueerd. Deze interventie heeft als doel om aan de hand van groepsdruk het beginnen met roken door leerlingen uit de brugklassen van het voorbereidend middelbaar beroepsonderwijs te verminderen. De interventie bestond uit het klassikaal afsluiten van een overeenkomst om de komende vijf maanden niet te gaan roken, voorafgegaan door drie lesmodules. Deze klassikale interventie staat bekend onder de naam Actie Tegengif en is gebaseerd op het Europese project Smoke Free Class Competitie. De klassen waarin gedurende 5 maanden 90% van de leerlingen niet gerookt had maakten kans op een prijs. Voor de effectevaluatie werden bij dezelfde leerlingen drie keer gegevens verzameld aan de hand van een vragenlijst bestaande uit vragen over rookgedrag, attitudes, sociale invloed, eigen effectiviteit en intentie. De nulmeting vond plaats net voor de interventie (november 1998), de eerste nameting net na de interventie (in mei 1999) en de laatste nameting in april 2000. In de interventiegroep is 9,6% van de leerlingen begonnen met roken bij de eerste nameting en in de controlegroep 14,2%. Jongeren uit de interventiegroep hadden een odds ratio van 0,61 (95% BI= 0,41 - 0,90) om met roken begonnen te zijn bij de eerste nameting in vergelijking met jongeren uit de controlegroep. Bij de tweede nameting zijn de verschillen tussen interventie- en controlegroep niet meer statistisch significant. Deze resultaten laten zien dat een interventie gebaseerd op groepsdruk samen met het geven van lessen over roken op korte termijn effectief is om het beginnen met roken door

leerlingen met een laag opleidingsniveau tegen te gaan. Op langere termijn wordt de effectiviteit minder: roken zou daarom niet alleen in het eerste jaar aan bod moeten komen, maar ook daarna.

Een korte samenvatting van de resultaten, de discussie, de conclusies en de aanbevelingen worden in hoofdstuk 8 gepresenteerd. De belangrijkste conclusies zijn als volgt samen te vatten:

- De twee voorlichtingsprogramma's die worden beschreven in dit proefschrift zijn effectief om het meeroken door jonge kinderen en actief roken door jongeren op korte termijn te verminderen.
- Het effect van beide preventieprogramma's vermindert echter indien de voorlichting niet gecontinueerd wordt als het kind ouder wordt.
- De implementatie van het voorlichtingsprogramma 'Roken? Niet waar de kleine bij is' was succesvol. Een meerderheid van de verpleegkundigen werkzaam op het consultatiebureau gebruikt het programma. Het programma is echter nog niet voldoende geïnstitutionaliseerd binnen de consultatiebureaus.

Deze conclusies leiden tot een aantal aanbevelingen voor de uitvoering van jeugdgezondheidszorg, gezondheidszorgbeleid en onderzoek.

Voor de hulpverleners in de preventieve gezondheidszorg zijn de belangrijkste aanbevelingen dat zij door moeten gaan met het gebruik van het voorlichtingsprogramma 'Roken? Niet waar de kleine bij is' en dat zij deze voorlichting over meeroken moeten uitbreiden met extra activiteiten als het kind ouder wordt. Enerzijds kan dit door in de contactmomenten met ouders terug te komen op dit meeroken en anderzijds door nieuwe activiteiten. Het gebruik van de voorlichting om het beginnen met roken te voorkomen zou door de GGD'en op scholen gestimuleerd moeten worden mede als onderdeel van het schoolgezondheidsbeleid en van de Rookvrije school.
Naast de preventieve gezondheidszorg zou tevens de curatieve gezondheidszorg meer aandacht aan meeroken moeten besteden, vooral als het gaat om kinderen die gezondheidsproblemen hebben waarvoor meeroken een mogelijke risicofactor is.

De aanbevelingen voor het gezondheidsbeleid gaan vooral over het vasthouden van het effect van de preventie van meeroken door kinderen en van roken door jongeren op langere termijn en over de continuering van het gebruik. Voor het vasthouden van het effect wordt voorgesteld om een gezondheidsvoorlichtingscyclus te ontwikkelen, beginnend met de preventie van het beginnen met roken door jongeren, vervolgens de preventie van het roken tijdens de zwangerschap, de preventie van terugval na de zwangerschap en dan de preventie van het meeroken door kinderen. Door de ontwikkeling van zo'n cyclus wordt er systematisch aandacht aan roken gegeven. Het is ook van belang om in deze cyclus extra aandacht te besteden aan bepaalde risicogroepen, zoals gezinnen met twee rokende ouders en allochtone gezinnen. Een potentieel effectieve benadering van deze groepen zou kunnen bestaan uit een meer community-based of wijkgerichte aanpak.

Voor de continuering van gebruik is vooral de plaats van de voorlichtingsprogramma's in het nieuwe Basistakenpakket Jeugdgezondheidszorg van belang. Aanbevolen wordt om, gezien het belang voor de gezondheid en de aanwezigheid van effectieve preventieprogramma's, de preventie van roken en meeroken op te nemen in het uniforme deel van het basistakenpakket.

Een laatste aanbeveling voor beleid betreft de institutionalisering of inbedding van 'Roken? Niet waar de kleine bij is'. Deze institutionalisering kan worden bevorderd door een verbetering van de training voor hulpverleners in het gebruik van het voorlichtingsprogramma en het aanwijzen van een verantwoordelijke binnen elke thuiszorgorganisatie die het voorlichtingsprogramma gebruikt.

Als laatste worden de gebieden voor vervolgactiviteiten wat betreft ontwikkeling en onderzoek beschreven. Deze zijn:

- Onderzoek naar de bijdrage van meeroken aan gezondheidsproblemen waarvoor nog niet voldoende wetenschappelijk bewezen is dat meeroken een risicofactor is.
- Ontwikkeling en evaluatie van aanvullende voorlichtingsactiviteiten om risicogroepen te bereiken zoals gezinnen met rokende ouders, gezinnen met immigrante ouders, en oudere kinderen.
- Ontwikkeling en evaluatie van additionele activiteiten voor adolescenten om het effect van de Smoke-Free Class competitie en ook andere rookpreventie-programma's vast te houden.
- Onderzoek naar het effect van 'Roken? Niet waar de kleine bij' is op het stoppen met roken door ouders.
- Bepalen van de kosten-effectiviteit van deze voorlichtingsprogramma's.
- Ontwikkeling van een internationaal meetinstrument om meeroken door kinderen uniform te meten.

De belangrijkste boodschap van dit proefschrift is dat de voorlichtingsprogramma's 'Roken? Niet waar de kleine bij is' en de Smoke Free Class Competitie 'Actie Tegengif' effectief zijn om respectievelijk het meeroken en het beginnen met roken op korte termijn te voorkomen. Het vasthouden van dit effect, vergt echter langdurige en systematische inspanning. Hulpverleners, ander intermediairs en beleidsmakers zouden meer aandacht aan het vasthouden van de effecten van gezondheidsbevordering moeten geven. Een éénmalige activiteit is niet voldoende om rookgedrag langdurig te veranderen. Regelmatige aandacht en herhaling van de boodschap zijn noodzakelijk om het korte termijn effect vast te houden en om de beoogde gezondheidswinst te behalen.

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Curriculum Vitae

Mathilde Rosalie Crone was born on October 28, 1969 in Dordrecht. From the age of 10 until the age of 15, she lived in France and as a consequence she followed the first three years of secondary school on a school near Montpellier and a school near Paris. In 1988, she received her VWO diploma at the Ichthus College in Veenendaal. In that same year she started studying health sciences at the University Maastricht, starting with biological health sciences but graduating in health education and promotion. In August 1994, she graduated. In the first four months after graduating she worked as a PR-coordinator in the Filmhuis Lumière in Maastricht. In January 1995, she started working at TNO Prevention and Health. Her main theme of research became the prevention of passive smoking by children. As part of this she developed and evaluated the education program 'Smoking? Not in presence of the little one' and evaluated the Smoke Free Class Competition. Besides, she was involved in various other studies in public health, such as the implementation and evaluation of school health policies, health promotion in Eastern Europe, and prevalence and causes of psychosocial problems among children and adolescents. After finishing her dissertation, she will continue working at TNO on these same research themes.

Bescherm kinderen: laat hen niet uw rook inademen