Research and Practice of Health Promotion

Internet-based smoking-cessation aids for young people – Practical experience and current evidence

Documentation of a FCHE workshop held in Berlin, 18–19 September 2008

Volume 14

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Preface

The prevention of tobacco consumption among adolescents and young adults can be regarded as one of the key tasks of health promotion. Within its youth campaign "rauch-frei" ("smoke-free"), the Federal Centre for Health Education (FCHE) is actively working in this field, aiming to prevent young people from starting smoking, to inform them about the risks of passive smoking and to protect them from its consequences. Another goal of the campaign is to provide a range of different programmes that help people to stop smoking. In addition to various activities to promote a critical view on tobacco consumption within the target group, "smoke-free" provides several ways of supporting young people who want to stop smoking.

Due to the high proliferation of Internet access and its increasing importance in every-day life, the FCHE has extended its smoking-prevention activities to this medium. In 2003, it has launched "rauch-frei.info", an online platform for young people, hosting a fully automated cessation programme for young smokers.

The benefits of web-based cessation aids are evident. Via the Internet, these can instantly be accessed by a large part of the target group. And by taking advantage of computer-tailoring methods, it is possible to adapt the programme to the individual needs of each participant and thus help more effectively. Moreover, interactive features like bulletin boards enable participants to help each other.

Web-based cessation interventions, especially those aimed at young smokers, are a novel technology. The body of experience concerning their effectiveness and working mechanisms is limited, thus it is desirable to collect all the relevant expertise gained in this area so far.

Therefore in September 2008, the FCHE conducted a workshop with several scientists and practitioners working in the field of smoking-prevention and web-based tobacco interventions for young smokers. In total, five programmes from several European countries were presented. Moreover, the challenges associated with their development and dissemination were discussed in detail. The core results of this expert meeting are illustrated in this volume of the series "Research and Practice of Health Promotion", providing an insight into the current state-of-the-art of this innovative and promising approach in the field of tobacco prevention.

Cologne, December 2009

Prof. Dr. Elisabeth Pott
Director of the Federal Centre
for Health Education

Workshop Outline

Theme:	Internet-based smoking-cessation aids for young people – Practical experience and current evidence
Aims:	• To collect the present expertise in the field of web based tobacco interventions for young people • To review the effectiveness and the working mechanisms of present programmes • To discuss the challenges regarding their future development and dissemination
Workshop dates:	8–19 September 2008
	Per Kim Nielsen, Danish Cancer Society Programme URL: Xhale.dk *Froukje Dijk*, University of Maastricht Programme URL: Smokealert.nl *Marc-Dennan Tensil*, delphi corporation Programme URL: rauch-frei.info/programm *Oliver Padlina*, University of Zurich Programme URL: feelok.ch *Håvar Brendryen*, University of Oslo Programme URL: Happyending.no
Other participants:	Annette Geier (IFT, Munich), Barbara Isensee (IFT-Nord, Kiel), Benjamin Jonas (delphi corporation, Berlin), Albert Kern (German Federal Ministry of Health, Berlin), Christoph Kröger (IFT, Munich), Peter Lang (FCHE, Cologne), Peter Lindinger (German Cancer Research Centre, Heidelberg), Mareike Strunk (FCHE, Cologne), René Thyrian (Greifswald University), Peter Tossmann (delphi corporation, Berlin)
Chair: Conference directors: Organisation:	Christoph Kröger (IFT) Peter Lang (FCHE), Mareike Strunk (FCHE) Peter Tossmann (delphi corporation), Benjamin Jonas (delphi corporation)
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Contents

1 Introduction

1.1 Background

Smoking is the single most preventable cause of death worldwide. Every year, 5.4 million deaths worldwide are related to the consumption of tobacco [1]. Due to a fast onset of addictive symptoms, especially among young smokers, and a high probability of continuing smoking into adulthood [2, 3], tobacco consumption among adolescents is a particular challenge to health policy. In Europe, currently about 29% of the adult population smokes; among 15-year-olds, the weekly smoking prevalence lies around 24% [4].

Worldwide, numerous tobacco control strategies are employed. Due to the high prevalence of tobacco consumption, diverse population-based measures are taken. In addition to various other methods, numerous educational campaigns are conducted that aim to reduce the smoking rate of the population. Despite reaching large numbers of the target group, campaigns delivered by mass media are often very ineffective with regard to quit rates [5]. On the other hand, clinical interventions are much more effective. Due to the small number of participants, their reach among the smoking population is very limited however [6].

Due to the high proliferation of Internet access in developed countries (cf. http://www.internetworldstats.com/stats4.htm) it has become possible to utilise the World Wide Web for health communication and thus to reach a considerable proportion of the smoking population. Moreover, by using tailoring algorithms, web-based smoking interventions are able to deliver support customised to the individual needs of its users.

In 2004, Bock et al. [7] identified 46 Internet-based smoking-cessation programmes in English. However, the authors criticised the fact that many interventions make insufficient use of the possibilities of interactivity offered by the medium. In 2008, the research team led by Beth Bock repeated its analysis and found a significant improvement in the quality of the programmes [8]. Moreover, the effectiveness of web-based smoking-cessation aids has been repeatedly documented in recent years [9, 10, 11, 12, 13].

However, most of these programmes are aimed at adults. Programmes that explicitly target young people or young adults are still relatively rare [e.g. 14]. Furthermore, they are confronted with the challenge that young smokers often display less willingness to change their smoking behaviour than adults; and even those who are motivated to quit often perform poorly in intervention programmes [15]. Therefore, cessation tools for young people face a special challenge in providing effective support for this age group.

1.2 The workshop: Target and participants

In order to assemble current expertise in this particularly important area, the German Federal Centre for Health Education (FCHE) conducted a workshop in autumn 2008 with

several experts working in the field of smoking-prevention. The main goal of the workshop, which followed on from a symposium held in 2004, was to establish the open exchange of experiences among those involved with the development and evaluation of web-based cessation aids for young people. Therefore, several scientists and practitioners in this area were invited to present their programmes and to discuss the current problems, benefits and challenges of these interventions. The goal was to deal with the following main questions:

- What theoretical concepts are currently in use within these interventions?
- How are the programmes designed? What modules are utilised?
- What are the results concerning their effectiveness?
- Are there findings concerning the underlying working mechanisms?
- What experiences are there concerning the dissemination of the cessation aids?
- How far is their reach; i.e. how extensive is their usage within the target group?
- What possible means of improving these programmes are there?
- What challenges are there regarding future development?

Five experts working in the realm of web-assisted tobacco interventions were invited in order to present and to discuss the programmes that they are currently working on:

Per Kim Nielsen, Danish Cancer Society – Xhale.dk: Established in 2004 by The Danish Cancer Society, the cessation programme "Xhale" is used by approximately 3,500 participants per year. The programme is aimed at young people aged between 15 and 25 and delivers its content both via traditional WWW and via text messages on mobile phones. A scientific evaluation has recently been conducted; another study is currently being carried out. The developers of "Xhale" also took part at the workshop held by the FCHE in 2004.

Froukje Dijk, University of Maastricht – Smokealert.nl: "Smoke Alert" originates from a research project studying the application of computer tailoring in smoking interventions for adolescents and was developed at the Maastricht University, the Netherlands. It particularly has been developed for utilisation in school classroom settings. The intervention consists of three tailored pieces of advice in the six months after filling out an initial questionnaire. It was scientifically evaluated in a randomised control trial. Mrs. Dijk participated in the first workshop organised by the FCHE in 2004.

Marc-Dennan Tensil, delphi corporation – rauch-frei.info/programm: "rauchfrei" or "smoke-free" is a web-based cessation programme for young people which is part of the FCHE-operated smoking-prevention website rauch-frei.info. The cessation tool "smoke-free" was developed by the delphi corporation in Berlin. Launched in March 2005, the programme is used by around 2,000 participants every year. After registration, the intervention is divided into two distinct phases: the preparation phase and the cessation phase. A study to evaluate the effect of the programme was finished recently.

Oliver Padlina, University of Zurich – feelok.ch: Coordinated at Zurich University and developed by different institutions working in the field of health promotion and prevention, "feelok" is a web-based programme for adolescents aged between 12 and 18. Unlike the previous programmes, "feelok" does not focus solely on smoking, but also covers several other topics associated with well-being, such as stress, sexuality or self-confidence. Like "Smoke Alert", "feelok" can be utilised during school lessons or in leisure activity settings. The section covering smoking has approximately 1,000 visitors per month. It deals with the topic of smoking prevention and cessation and offers information that matches the motivational stage of the visitors.

Håvar Brendryen, University of Oslo – Happyending.no: Established in 2003 on the Norwegian market, "Happy Ending" is a smoking-cessation intervention that links both web- and mobile phone-based communication channels. The programme is organised as a "guided tour" through a predefined sequence of content and lasts for up to 54 weeks.

Unlike the previous interventions, "Happy Ending" is aimed at all age groups and is a commercial business project. Due to the thorough investigation of programme effectiveness by two randomised controlled trials and the complex programme architecture, the experiences gained from "Happy Ending" were also expected to be valuable for the workshop.

The following experts working in the field of smoking-prevention attended the discussion, as well (listed in alphabetical order):

- Annette Geier – IFT, Munich
- Barbara Isensee – IFT-Nord, Kiel
- Benjamin Jonas (organisation) – delphi corporation, Berlin
- Albert Kern – German Federal Ministry of Health, Berlin
- Christoph Kröger (chair) – IFT, Munich
- Peter Lang (host) – FCHE, Cologne
- Peter Lindinger – German Cancer Research Centre, Heidelberg
- Mareike Strunk (host) – FCHE, Cologne
- René Thyrian – Greifswald University
- Peter Tossmann (organisation) – delphi corporation, Berlin

The presented interventions are illustrated in chapters 2 to 6. All articles follow a similar structure, giving information about the theoretical framework and design of each programme. Furthermore, recent results of the scientific evaluation are outlined and discussed. Plans for the further development are also stated for each intervention.

Chapter 7 summarises the key topics of the discussion that followed the presentations. These include dissemination strategies and characteristics relevant for the success of these interventions as well as other issues.

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Per Kim Nielsen,
Danish Cancer Society

Xhale: Smoking cessation for young people using digital media

2

2.1 Introduction

In Denmark in 2005, 26.3% of boys and 32% of girls in the age group 15 to 20 smoked either daily or weekly [1]. In 2006 the figures were 27% of boys and 26% of girls [2]. Every year many of them try to quit, but most are unsuccessful [3, 4, 5, 6]. In the light of this, we felt that there was a need for more initiatives that would support young people in getting through a more qualified attempt at smoking-cessation. The project "Children, Young People and Smoking" at the Danish Cancer Society aims to create a broad range of suitable methods of support to young smokers in order to meet the needs of as many of them as possible. Previously attempts had been made to set up smoking-cessation courses in selected schools, in which young people had followed a formalised smoking-cessation course during school hours [7]. Currently we are trying out a less formalised programme consisting of smoking-cessation events with emphasis on competitions, tests and short conversations. We expect to evaluate this study at the end of 2008.

Not all young people, however, find the concept of receiving personal advice in school attractive. Surveys suggest that young people primarily wish to manage smoking cessation on their own or with help from friends [8]. Accordingly it is also important to develop support that is not based on conversations with health professionals. From 2001 to 2004 the Danish Cancer Society held an annual smoking-cessation competition with registration via the Internet or text message. The competition revealed the potential of digital media, in relation both to the dissemination of the intervention programme and the probability of smoking cessation among young people [9]. However, the weak points of the competition format are that it does not provide permanent support, and that the competition in itself involves considerable expense each year connected with the new start-up, updating the content and marketing. As the technology develops, the advantages of permanent digital smoking-cessation support for young people becomes more and more obvious.

There is a huge amount of information on the Internet relating to smoking cessation for young people. In 2002 an American study identified a total of 35 active smoking-cessation websites for young people [10]. This figure is probably far higher today. Experience shows, however, that the quality of the websites varies greatly. A Canadian study found eight smoking-cessation websites aimed at young people with interactive components such as quizzes, games and discussion forums. The remainder were reports, various documents or texts taken from material previously available for distribution [11].

At a European level, in 2005 five countries (the Netherlands, Germany, Finland, Switzerland and Denmark) provided a national digital smoking-cessation programme for young people [12]. Until now only a few studies have looked at the effect of digital smoking-cessation programmes for young people, and overall, too much uncertainty is attached to these studies for us to be able to say anything definite about the long-term effects (typically because the test samples were too small and the follow-up periods too

short) [13, 14, 15, 16, 17, 18]. There is therefore a need for more evidence-based studies, which can contribute knowledge about the content and not least the long-term effect of digital smoking-cessation programmes for young people.

We have now measured the effect of the first version of xhale.dk on 600 participants, and we are also in the process of measuring the effect of the new version of xhale.dk, where participants are allocated at random to two different programmes with a greater or lesser degree of computer tailoring. We expect to analyse approximately 2,000 participants.

In the four years of the existence of xhale.dk 14,000 participants have gone through a smoking-cessation course, and according to our first analysis, which we describe here, over 12% were still smoke-free one year after using the system.

2.2 Theoretical background

Before xhale.dk was established, we carried out a literature study in 2004 [27], which was to evaluate among other things which determinants were the most significant in relation to young people's smoking cessation. This study has been used to select a number of determinants that have an effect and are dealt with when one is working through the programme in xhale.dk. The literature search was not made on the basis of the smoking-cessation process used only in connection with the application of digital media, but instead was quite general. Therefore we subsequently had to make a selection so that the determinants could be used in xhale.dk.

The literature search produced the following results within four areas:

1. Social and environmental determinants: we found that smoking cessation among young people is influenced by their friends' smoking, their parents' smoking and by smoking in the local environment. We found a link between the price of cigarettes and smoking cessation among young people.
   In Xhale we have emphasised pressure from friends and social relationships, and have made a great deal out of the price of cigarettes: "How much have you saved so far?" etc.
2. Physical determinants: we found that tobacco consumption, age of debut and physical dependency are all relevant to smoking cessation for young people.
   In Xhale we take these determinants into account by using the person's answers in these areas in the questionnaire, in such a way that they are incorporated into the personal answers by text message and e-mail.
3. Socio-demographic determinants: We found that social stability (uninterrupted schooling and stable home environment) are positively linked to smoking cessation among young people, while "being younger than one's classmates" is negatively linked to smoking cessation.
   We have not been able to include this area in the digital smoking-cessation process.

4. Individual psychological determinants: we found that self-efficacy, interventions about stopping smoking, well-being, problem behaviour, attitudes to smoking and smoking-cessation and coping resources are all related to smoking cessation among young people.
   We have included these determinants in the website and the personal messages.

Below we have defined these determinants as learning goals and transformation goals in the Xhale system.

2.3 Structure of the intervention

Xhale consists principally of a website, a database, and the sending of text messages, picture messages and e-mails to users. Version 1 was used from September 2004, when the system was marketed and implemented, to the beginning of 2007. Based on our experiences and the first analysis of the system, a new version was launched in the spring of 2007.

Version 1 was a less tailored computer program than the present version 2, as the contents of the website and in the text and picture messages were mainly put together based on the answers users had given in the questionnaire when they signed up, and upon the stage of the user in the smoking-cessation process in relation to his or her planned quit date.

Emphasis was placed on the following learning and change goals in the system:
- Dealing with pressure from friends and social relations.
- Dealing with stress, negative feelings and dependency.
- Building up belief that smoking cessation is possible (self-efficacy).
- Developing the possibility and ability to set personal goals.
- Getting the target group to understand the health-related consequences of smoking as being personally relevant (motivation for smoking cessation).

In versions 1 and 2 on the website there is access to the following main areas:
- Why smoking cessation? – information about the direct advantages of smoking cessation
- The chamber of horrors – films, photographs, games, exercises
- Smoking in figures – the number of smokers in Denmark, specifically among young people
- Smoking and the body – facts about the damage to health caused by smoking
- Dependency – facts about the different forms of dependency
- Myths – putting right common misconceptions about smoking
- Questions – answers to frequently asked questions
- For and against smoking cessation – ambivalence diagram

Figure 1: Version 2 contains more opportunities to apply the user's motivation, the stages of smoking cessation, as well as greater control and participation on the part of the user.

- Smoking and weight – facts about smoking and weight, and the opportunity for personal weight calculations
- Problem page – personal online advice
- Discussion forum – opportunity to exchange experiences and advice with like-minded people
- Your diary – countdown, personal information, own experiences, exercises etc. Can be closed or open to others in the form of a blog.

Two parallel systems were constructed in version 2. The first looks partially like version 1, with some changes mainly in relation to the results of the qualitative evaluation, and the second has much more computer tailoring. More options have been built in for the user, and different answers have been built into the text messages and e-mails in

relation to the user's motivation, readiness etc. Each new user is put into one of the two parallel systems by means of a random system of distribution. This makes it possible to analyse the need for tailoring in relation to effectiveness.

2.4 Evaluation

2.4.1 User profile

After one year online (Sep. 2005) 3,144 people had signed up to xhale.dk. In January 2006, there were 5,010 and in August 2008 more than 14,000 people had attempted quit smoking with the help of xhale.dk.

Age: The average age of those signed up is 23.4, and as many as 70.3% of users are located within the target group of 15 to 25-year-olds. 27.2% of the remaining users are over 26 years old, and 2.5% are younger than 15. This means that 2.4% of all smokers in the primary target group have gone through smoking cessation at xhale.dk.

Consumption: The average consumption is 16.1 cigarettes a day. This means that 65.3% of those signed up at xhale.dk smoke 15 cigarettes a day or more, and are accordingly heavy smokers, while 34.7% smoke fewer than 15 cigarettes a day. This group covers both occasional and daily smokers, and consumption increases with age. It should be noted that the proportion of heavy smokers is markedly greater among Xhale's users

No.	Reason for smoking cessation	Overall%	Women%	Men%
1	Health	64	67	59
2	Money	33	34	31
3	Fitness	15	12	19
4	Attractiveness/aesthetics	14	15	14
5	Consideration towards boy/girlfriend	6	5	7
6	Consideration towards family	5	6	5
7	Unwanted dependency	5	6	3
8	Pregnancy or wish to be pregnant	3	5	1
9	Consideration towards friends	2	3	2
10	Consideration towards children	2	3	1
11	Mental well-being	2	1	2
12	Social conditions*	2	2	2
13	Payment of driving lessons/licence	1	1	0

* Relates to the fact that it has become difficult and unpopular to be a smoker.

Table 1: Reasons for smoking cessation (15 to 25-year-olds)

than in the population as a whole, where approximately half of daily smokers are heavy smokers. Among the 16 to 20-year-olds around a third of daily smokers consume more than 15 cigarettes a day [1]. The average consumption of the 15 to 25-year-olds at xhale.dk is 15.3 cigarettes a day. Consumption increases with age to 18.5 cigarettes a day for those signed up in the over-25 age group.

Gender: In terms of gender those signed up are distributed 52.3% women and 47.7% men. There are only slight differences in consumption by gender – although consumption by men is a little higher. This trend applies to all age groups.

Reasons for smoking cessation: When signing up, all participants are asked about their most important reasons for smoking cessation. Table 1 gives a summary for the 15 to 25-year-olds.

Health is far and away the most important reason for smoking cessation. This is followed by money. The following reasons for smoking cessation, fitness and attractiveness/aesthetics have almost the same importance. If we consider the most important reasons for smoking cessation from a gender perspective, health is a much more important reason for smoking cessation among women than among men. On the other hand, fitness is a more important reason for men than it is for women. It should also be mentioned that the reasons for smoking cessation among the user group as a whole correspond to those found among the 15 to 25-year-olds.

Choice of media: xhale.dk offers different types of smoking-cessation support, partly via a personal and interactive programme on the website, and partly via text-message and e-mail programmes. These elements can be combined in different ways, and 73% of the users choose to combine them in such a way that they receive both e-mails and text messages. Others choose to use only a single function. At 17.2% e-mail is by far the most popular function among the users who only choose one function. The user percentages for the website and the text messages are 5.5% and 4.3% respectively. This is a general trend regardless of gender, consumption or age. As regards age, the most marked deviation is in the 36+ age-group, where 34.6% use only e-mail.

2.4.2 Quantitative analysis: Use and effectiveness of the xhale.dk system

Methods

A 12-month follow-up study was instigated in October/November 2005 with telephone interviews of both an intervention group and a control group. The intervention group consisted of daily smokers aged 15 to 25 who had signed up for smoking cessation at xhale.dk in the period of 1 September to 1 December 2004. A further requirement was

that they had submitted their mobile telephone number when they signed up. This applied to 686 participants. The control group was selected from young people who had stated in the national survey of young people's lifestyle habits (MULD 2004) that they were daily smokers and were motivated to try smoking cessation [1]. As the collection of data for MULD took place from November 2004 to March 2005, the reporting time for MULD participants is largely identical to the signing-up time for the selected group of xhale.dk users (only a few respondents answered MULD 2004 later than 1 January 2005). As an extra provision – to ensure that both the intervention and control groups were daily smokers one year before the telephone interviews started – all respondents had to answer whether they were daily smokers in August 2004. If they were not, they were omitted from the survey. In total 561 young people participated in the telephone interviews. On this basis it has been possible to put together two groups with identical smoking status on 1 September 2004, one of which was exposed to xhale.dk (the intervention group), while the other remained unexposed to xhale.dk (the control group).

The members of the intervention group were contacted on the mobile telephone number that was submitted when signing up at xhale.dk, while members of the control group were called on the telephone number related to their home address held at the central national register (all participants in MULD 2004 were selected via the central national register). In total 1,247 respondents were contacted in this manner up to four times by telephone from 10 October to 1 November 2005. Due to technical problems – especially in contacting the intervention group via their mobile telephones – it was by no means possible to contact all the participants (because of new mobile numbers, mobile telephones not being switched on, non-existent numbers). The telephone survey resulted in 358 unsuccessful calls in the intervention group and 198 in the control group. Respondents who were contacted but did not wish to participate, along with those who said that they were not daily smokers in August 2004, were excluded. In addition the members of the control group who said in their MULD answers that they had signed up for xhale.dk or were not motivated to try smoking cessation were also excluded. In the analysis of effect (Table 2) the members of the intervention group who were outside the 16 to 20- age group were also omitted. This procedure resulted in a sample of in all 134 positive answers from the intervention group (19.5%) and 192 from the control group (34%).

All participants in both the intervention and the control groups provided information about: gender, age, work/educational status, previous tobacco consumption and best friend's smoking habits. Both groups were matched on selected variables such as age and motivation for smoking-cessation, while gender was a possible confounder when determining a variation in effect.

The effectiveness of xhale.dk was measured according to two success criteria: quit rate and smoking-cessation attempts. In accordance with recommendations from the respected CDC/SRNT panel of experts, only people who have not smoked for the last 30 days are counted as "smoke-free" [19]. People who have not smoked for periods of

one to seven days and eight to thirty days are counted as respondents who have not quit. This requirement for a relatively long quit period is connected to the tendency of young people to vary their smoking patterns. In some periods they do not smoke at all, while in other periods they smoke heavily. Therefore it is important to find a method that excludes periodical smokers, so that only those who "really" quit smoking are included when effectiveness is being measured. In addition, a conservative quit rate estimate is produced by counting all those who answer "do not wish to participate" as smokers in the survey.

With regard to the measurement of smoking-cessation attempts, the respondents were asked if they had been smoke-free for a week or more, or a month or more. As with the quit rate, smoking-cessation attempts of longer than a month were evaluated as the more realistic of the two periods.

Participants from the intervention group were asked about their experience of and satisfaction with xhale.dk. The relevant questions were: "Has xhale.dk supported your smoking cessation?", "Has xhale.dk made a difference in relation to previous attempts at smoking cessation?" and "Would you recommend xhale.dk to your friends?"

A logistic regression analysis is used on the exposed group (the intervention group) and the unexposed group (control group) in relation to the effect variables that have been set up. The results are presented as an odds ratio (OR) with 95% confidence intervals (CI).

Results

In all 12.6% of the participants aged 15 to 25 were still smoke-free one year after signing up – i.e. they had not smoked during the previous month. In comparison this was the case with 4.0% of the control group. In an attempt to calculate the probability of smoking cessation when using xhale.dk, the control and intervention groups were matched on

Variable	Intervention group	Control group	OR and CI 95%
Quit rate	(n=166*)	(n=249*)	
Not quit	91.6% (152)	96% (239)	2.2 (0.95–5.08; p=.062)
Quit for 30+ days	8.4% (14)	4% (10)	
Attempt at smoking cessation	(n=166**)	(n=249**)	
More than 1 week's duration	50.6% (84)	28.9% (72)	2.52 (1.67–3.79; p<.001)
More than 1 month's duration	22.3% (37)	11.2% (28)	2.26 (1.32–3.87;p<0.01)

* Respondents where contact was established, but who did not wish to participate, are classified as "smokers".

** Respondents where contact was established, but who did not wish to participate, count as respondents with no attempts at smoking cessation.

Table 2: Effect variables

selected variables such as age and motivation for smoking cessation, and potential confounders are checked for. The statistical power of the calculations is, however, too low to have a significant effect, because there are too few respondents in the intervention group. The trend is, however, that the chance of achieving smoking cessation by using xhale.dk is more than twice as high: odds ratio 2.2 (0.95–5.08; CI 95%, see Table 2). The probability of lasting smoking-cessation being achieved by participating at xhale.dk is increased significantly. Smoking-cessation attempts of a week or more show an odds ratio of 2.52 (1.67–3.79; CI 95%), while the probability of a more whole-hearted attempt of a month or more is odds ratio 2.26 (1.32–3.87; CI 95%).

In total, 50% of the users felt that the support from xhale.dk was important for their smoking cessation to a greater or lesser extent. Fewer than one out of three users (31%) felt that xhale.dk made their smoking-cessation attempt easier than previous attempts, while 56% did not feel that this was the case. This does not mean however that the majority were dissatisfied with xhale.dk. In total, 60% state that they would recommend the programme to others – only 27% would not (Table 3).

The results of the survey document a trend towards the chances of smoking cessation being twice as high when using xhale.dk. With a total of 12.6% of the users still not smoking a year after they had signed up, the quit rate is higher than one can expect among young smokers in general. This can be shown both by comparing with the control group and by looking at studies of young people's spontaneous smoking cessation. A Finnish survey shows for example that 4.1% of all daily smokers aged between 15 and 21 quit smoking within a 12-month period – i.e. the same level as in the Xhale study's control

Variable	Intervention group
Was xhale.dk a support?	(n=223)
To a very high degree	6% (14)
To a high degree	14% (31)
To a lesser degree	30% (66)
Not at all	46% (103)
Can't remember	4% (9)
Did xhale.dk make smoking cessation easier in relation to your previous attempts?	(n=223)
Yes	31% (69)
No	56% (125)
Don't know	5% (11)
Haven't tried before	5% (11)
Can't remember	3% (7)

Table 3: User satisfaction with xhale.dk

group [20]. This low spontaneous quit rate among young people is also seen in other foreign studies [21, 22, 23]. One has therefore to assume that the basis of comparison with the control group – and consequently the calculation of effectiveness in the present study – occurs on a realistic basis.

2.4.3 Qualitative analysis of use

Method used for the qualitative analysis

The survey of young people's use of and reaction to xhale.dk is based on interviews with 24 users of the smoking-cessation programme – 14 female and 10 male. All of them were aged between 15 and 25 and in the process of smoking cessation at xhale.dk. The interviews were carried out in the autumn of 2005. All the interviews were transcribed in their full length and, in order to get a better overview, the content was divided into categories in relation to the main and subthemes [24].

The respondents were divided into two groups: Those who have been smoke-free for the whole period since signing up and those who have had one or more short periods where they did not smoke, after a fixed quit date, and therefore are still described as smokers.

Result of the qualitative analysis

The three most important reasons for smoking cessation were health, money and consideration towards children/pregnancy. Health was the factor most often selected, so even though xhale.dk is aimed at young people, health is also a significant motivational factor for stopping smoking, just as it is with adults.

Knowledge of xhale.dk was gained largely by Internet search, which is why optimisation in relation to search engines is a significant recruitment factor. In addition xhale.dk was publicised on TV, business cards, and by seeing others receive text messages from xhale.dk. It is clear that the method of finding help at xhale.dk differs depending on the motivational phase of the respondents. The majority of respondents were in the decision or action phase [25, 26], when they first became aware of xhale.dk. Ten respondents were in the decision phase and seven were in the action phase. These respondents had mainly found out about xhale.dk through search engines such as Google. The remainder were in the consideration phase and had mainly been motivated by media coverage and traditional marketing.

In the respondents' experience xhale.dk is provides good and personalised support for smoking cessation, and one where all forms of admonition are avoided. The experience of personal support is in the first place linked to the fact that the information is based on the user's smoking-cessation status. In the second place comes the fact that the users feel that the support comes from an unknown friend:

"It might well be that they didn't know me, and it might well be that they weren't close by. But I really felt that I was letting myself and a whole load of other people down because they kept on taking the time to look after me – to send the text messages and e-mails to me. I know that it's a computer that's doing it, but you still feel a little bit that you are letting a load of people down". K, 20-years-old

The use of usernames when contacting users is an important reason for respondents experiencing that the information is coming from an unknown friend. But also the use of the two forms of media that young people use most in their day-to-day communication with friends – e-mail and text messages – helps make xhale.dk more personal.

The respondents that signed up were very positive about the opportunity to set a later quit date. They were also very happy that xhale.dk notifies them by e-mail and text messages of the support available prior to the smoking-cessation date:

"Up to the quit date I had set for myself they kept on saying: 'Now there are only four days to go' and 'Now there are only three days to go'. It was just nice that they hadn't forgotten me". K, 20-years-old

Opinions concerning the length of the support period were divided. One group of respondents felt that the two months of the support period were sufficient. Others would have liked to have the opportunity to receive support for a longer period. There was, however, general agreement that an extension of the period should be available that the user has the chance to say yes or no to.
Overall the respondents wanted to see the programme be developed further in the following three areas:

Interaction. Several of the respondents requested the opportunity to send questions by text message and e-mail to smoking-cessation counsellors and possibly to other users of xhale.dk. They also wanted to have the chance to order a support text message in situations where smoking cessation is difficult.

Continued contact at the end of a smoking-cessation programme. The young people who did not succeed with a smoking-cessation programme wanted the option of being "kept in line" by xhale.dk when they had begun smoking again. This support could include users being sent encouraging and motivating messages in the period up to the next smoking-cessation attempt. It is however important to the users that this is only an option.

Merchandise and diplomas. Some of the young people wanted xhale.dk to help users to show the outside world that they were non-smokers. Some of the ideas mentioned were non-smoker armbands and t-shirts, as well as "smoking not allowed" stickers. There were also many requests from users who have been smoke-free in the xhale.dk period to receive a diploma.

The last two suggestions show how major a decision smoking cessation is for young people, and that there is a need to show one has been successful. One 21-year-old man says:

> *"It could be fun to receive a diploma after two months that you could hang up. Then you could stand there and say: 'Yes, now I've been through that, and it was pretty hard at times, but look at that wall – I'm smoke-free!'"*

2.5 Conclusion and outlook

2.5.1 Conclusion from the first analysis of use and effectiveness

In total 12.6% of participants aged 15 to 25 were still smoke-free one year after signing up – i.e. they had not smoked in the previous month. In comparison this was the case for 4% of the control group. If we match the control and intervention group on selected variables such as age and motivation for smoking cessation, the strength of the calculation is too low for a significant effect. The trend is, however, that the chance of achieving smoking cessation by using xhale.dk is more than twice as high. The probability of achieving lasting smoking cessation by participating at xhale.dk is similarly increased.

Through xhale.dk it has been possible to create a smoking-cessation programme where both the content and the form of the communication attract the young target group. At the same time the survey shows that xhale.dk also reaches out to young people who will potentially stop smoking but who typically do not use conventional smoking-cessation support, such as telephone advice and courses.

The most important reasons for Xhale's success as smoking-cessation support to young people are that:

- The programme is anonymous and personal.
- It has a youthful image in its language, the layout of the site and the use of website, e-mails and text messages.
- It succeeds in focusing on the target group's primary needs for support and help in connection with smoking cessation.
- The information is factual and visual.
- The users decide themselves how much support is needed.
- The information comes directly to the user, with no planning required for participation.
- The programme is free.

If we look at the 24 respondents in the reception analysis, we get a picture of the marketing of xhale.dk primarily reaching young people who are in the Decision and Action phases of smoking cessation. It turns out, however, that it has also proved possible to start a smoking-cessation process for some young people in the Consideration phase.

If we look more closely at the opportunities for strengthening xhale.dk in relation to its appeal to young people and in relation to its effectiveness as an aid to smoking cessation, six main elements become apparent, which we introduced successfully into the second version of xhale.dk:

- More information based on the user profile, i.e. an extension of the tailoring system.
- More interaction. This applies both to interaction between the users and the programme and among the users. Several respondents asked for the chance to send questions to xhale.dk by text message and by e-mail or to ask for messages of support in situations where smoking cessation is proving difficult.
- More use of e-mails and text messaging. A large number of respondents want the possibility to receive more daily text messages and weekly e-mails. It also turns out that some of the respondents found out about xhale.dk by seeing others receiving text messages, and soon can also regard the extension of this service as an extension of the marketing.
- Option of continued contact with users who have started smoking again and are waiting to fix a new quit date.
- Option of an extended period of support.
- Merchandise and diploma.

2.5.2 New analyses in preparation

As described previously, in version 2 of xhale.dk we divided sign-ups into two courses with tailoring to a greater of or lesser degree. By means of this analysis we will be able to say what significance tailoring has in relation to effectiveness. The results of this analysis will also be more statistically robust, and we expect a significant result in relation to the smoking-cessation rate between those who have used xhale.dk and those who have not, but have been motivated towards smoking cessation.

We are in the process of collecting data from the people who participated in the course a year ago. Information is being gathered from approximately 4,000 people, divided into the control group and the two intervention groups. The result will be published in a scientific journal in the first part of 2010.

Social groups: In contrast to the group courses in smoking cessation we have carried out at various educational institutions and in other contexts, it has been demonstrated that different social groups are evenly represented in the xhale.dk system. We explain this by the fact that the media we use appeal to the target group and are the same media they use in their daily life, including people from lower socio-economic groups.

We have instigated a qualitative analysis in relation to the content to be used for lower socio-economic groups, and how assistance with smoking cessation is to be marketed to this group.

Pregnant women: A number of participants in xhale.dk explain that their motivation for starting smoking cessation is that they are trying to get pregnant, are pregnant, their partner is or is about to get pregnant, or that there are small children in the home. We are therefore in the process of examining which elements of the information are relevant to this target group, and how one can reach the target group before they have become pregnant. The greatest amount of damage to the embryo occurs during the first eight weeks of pregnancy. Can one market support for with smoking cessation through companies that make products for pregnant women and make pregnancy tests, or through health professionals or other sponsors?

2.5.3 Other activities in the field of changing health-related behaviour using digital media

Our success with the use of digital media for smoking cessation among young people means that we are now proceeding with a project to establish an institute for changing health-related behaviour using digital media. The aim of the "Institute for the digital promotion of health" is to create a framework for the development and dissemination of digital media, so that these become an effective and useful tool for changing health-related behaviour. Part of the job of the institute will be to ensure that evidence-based knowledge is obtained and disseminated to health-related projects.

In addition to being actively involved in research, the institute will also coordinate efforts across projects that use digital media to change health-related behaviour, and it will collect and communicate new knowledge and experiences from ongoing projects. Finally the institute will also itself be involved in generating and carrying out concrete digital health promotion projects. Accordingly, the institute will function as a competency centre for the use of digital media for the promotion of health. The institute will be constructed as a collaboration between companies, health organisations and the research environment of the universities.

The good results of xhale.dk have also meant that we will be able to assist in the development of a corresponding system for adults in Denmark.

In our evaluation of users' attitudes to the Xhale system, it was emphasised several times that the text message service was a significant factor in the course of their smoking cessation, and that many participants saved the messages on their mobile phones for inspiration later on. A number of the users used only their mobile phones during the course of their smoking cessation after having signed up on the Internet. Therefore we would like to develop a programme exclusively for mobile telephones, which makes use of all the new functions of these telephones like animation, pictures, films and Internet access.

2.5.4 Overall conclusion

We have shown that smoking-cessation interventions for young people aged 15 to 25 using the Internet, text messages, e-mails and computer-tailored programmes have almost as much effect as group-based courses, and that this method at the same time makes it possible to reach far more people and much more widely in the different social groups. This will mean that more young people can become smoke-free at the cost of fewer resources through using the digital media that they themselves use.

This system has to keep up with developments, as it is based on the forms of communication that young people use. Therefore when they begin to use mobile phones as almost their only medium of digital communication then we will have to change our support to incorporate these changes, e.g. the possibility of using mobile phones for pictures, sound, films and the Internet.

The xhale.dk system is mainly constructed for people who are already motivated for smoking cessation to a greater or lesser extent. The motivational element is found in the marketing and the recruitment. It is important that this part is included in various local initiatives. Marketing through paid mass-media communication has been shown not to attain the same response as local events and the use of other channels of communication. We achieved a very high level of response through allowing municipalities, places of education and trained youth smoking-cessation instructors to be in charge of recruitment. These are able to make the xhale.dk system their own, and accordingly, provide their own free smoking-cessation programme for young people.

Another marketing strategy that has given a great deal of response is to use newspapers and TV and to receive coverage in these media. Xhale.dk has been mentioned several times on national TV, which led to a very large number of new participants, particularly in connection with 1 January and New Year's resolutions. Some of the most important points in relation to getting young people to use "xhale.dk" are:

- Everything is free.
- Uses the forms of communication that young people use.
- Can be used when and where a young person needs help.
- Possibility of help at several levels and in several ways.
- Collaboration with marketing and recruitment locally and nationally.

The development of methods, systems, design, forms of communication and methods of evaluation are the elements that have required the most resources in connection with xhale.dk. There is a need to create opportunities for the exchange of ideas and methods so that it is not necessary to start from scratch every time a preventive digital initiative is to be developed. There is also a need for a standardisation of forms of evaluation so that it is possible to compare methods and interventions, both nationally and internationally.

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The group also includes: Peter Dalum, Aske Panduro, Louise Wohllebe and Lene Ringgaard.

Appendix

Variable	Intervention group	Control group
Gender	(n=223)	(n=192)
Male	52% (115)	63% (120)
Female	48% (108)	37% (72)
Age	(n=223)	(n=192)
15	6% (13)	19% (37)
16	13% (28)	13% (26)
17	15% (34)	20% (38)
18	12% (27)	20% (39)
19	11% (24)	27% (52)
20	9% (21)	0% (0)
21	8% (18)	0% (0)
22	9% (21)	0% (0)
23	2% (4)	0% (0)
24	8% (18)	0% (0)
25	7% (15)	0% (0)
Occupation	(n=223)	(n=192)
Basic school	4% (8)	2% (3)
High school	25% (55)	27% (52)
Vocational school	13% (29)	15% (29)
Social/health studies	0% (0)	4% (7)
Further education	18% (41)	14% (26)
In employment	33% (74)	29% (56)
Military service	0% (0)	0.5% (1)
Other	7% (16)	9% (18)
Help with smoking cessation	(n=223)	(n=192)
No help	0% (0)	94% (180)
Internet-based help	100% (223)	0% (0)
Smoking-cessation courses	3% (7)	0.5% (1)
Smoking-cessation helpline	0% (0)	0.5% (1)
Individual conversations	0% (0)	2% (4)
Other	7% (16)	2% (6)
Tobacco donsumption/per day	(n=223)	(n=192)
1–14	39% (86)	65% (124)
15+	61% (137)	35% (68)
Does your best friend smoke?	(n=223)	(n=192)
Yes	70% (156)	84% (162)
No	30% (67)	14% (26)
Other	0% (0)	2% (4)

Table 4: Background and process variables of the quantitative study

3

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Smoke Alert: A computer-tailored smoking-cessation intervention for Dutch adolescents

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3.1 Introduction

Over the past ten years, smoking prevalence among of Dutch adolescents has shown a small but consistent decline. The number of 15 to 19-year-olds that have in their lives smoked a cigarette at least once decreased from 67% in 1997 to 62% in 2007 [1]. Although only 3% of the non-smoking adolescents have the intention of starting smoking in the future, 25% eventually become regular smokers [1]. Smoking during childhood is a major predictor of smoking during adulthood [2]. Since the adverse health effects of smoking can be seen as a function of duration (in years) and intensity (number) of cigarette use, early onset means potentially more harm. Adolescents often start smoking as an experiment, thereby often influenced by their peers. This experimental behaviour can easily turn into a habit and often nicotine addiction. The years of adolescence provide a good opportunity for smoking-cessation interventions to help adolescents quit smoking before they enter adulthood. Of all adolescent smokers, more than half have attempted to quit at least once [3, 4]. Sussman [5] provided an overview of 66 smoking-cessation interventions, concluding that various programmes have been successful in increasing quit rates among adolescents. And although no programme can guarantee successful quitting for all adolescents, Sussman concluded that intervening is at least better than doing nothing at all. He also concluded that better quit rates were achieved by personal interventions (e.g. motivational enhancement and computer-tailored programmes) compared to more impersonal interventions like supply reduction and addiction-based programmes. Furthermore, classroom-based programmes showed better results than programmes implemented in medical clinics. Interventions that take place in schools are particularly suitable for Dutch adolescents since education in the Netherlands is compulsory for children up to 18. However, with regard to effectiveness of these programmes, there is no general agreement on the optimal methods and duration of interventions. In the Netherlands, several evidence-based smoking-prevention programmes have been developed [6–8]. The lack of an existing and evidence-based smoking-cessation programme for this Dutch target group was the rationale for developing a web-based cessation intervention. The intervention that was developed was called Smoke Alert and consisted of computer-tailored smoking-cessation advice that was mainly delivered through the Internet. The intervention is described below.

3.2 Theoretical framework

The Smoke Alert intervention is based on the I-Change Model [9, 10]. The I-Change Model incorporates concepts from several cognitive models, such as the Transtheoretical Model [11] and the Theory of Planned Behaviour [12] The I-Change Model or the Integrated Model for explaining motivational and behavioural change is derived from the Attitude – Social influence – self-Efficacy Model [13, 14], that can be considered as an integration of ideas of Ajzen's Theory of Planned Behaviour, Bandura's Social Cognitive Theory, Prochaska's Transtheoretical Model, the Health Belief Model, and goal-setting

theories. Previous versions of this model (referred to as the ASE model) have been used to explain a variety of types of health behaviour.

The I-Change Model is a phase model and assumes that at least three phases in the behavioural change process can be distinguished: 1) awareness 2) motivation and 3) action. Particular and different determinants are relevant during each phase.

Awareness. Awareness of a particular problem in a person is the result of accurate knowledge and risk perceptions of the person about his or her own behaviour (not all people are aware of the level of their own behaviour, for instance, many overestimate the amount of their physical activity. Cues in their environment (e.g. a person with cancer) may also prompt a person to become more aware of a particular risk and the need to adopt a particular type of health behaviour.

Motivation. Motivation to change behaviour is regarded as being dependent on a person's attitude (the results of perceived advantages and disadvantages of the behaviour), socially influenced beliefs (norms of others, behaviour of others, and support of others) and self-efficacy expectations (the perceived ability to perform a particular type of health behaviour). The ultimate result in level of motivation to adopt a type of health behaviour can be measured by intentions: a concept derived from Fishbein & Ajzen's theory of reasoned action or related concepts such as the stage of change concept of Prochaska's Transtheoretical Model.

Action. Intentions do not necessarily lead to behaviour. Factors determining action, besides positive intention, are again self-efficacy, action planning and goal setting. With regard to action planning we distinguish preparation planning (planning actions required to change), initiation planning (planning the actions needed to perform the new behaviour for the first time) and coping or maintenance planning (planning the actions to cope with barriers and relapse in order to maintain the realised changes). Additionally, the development of skills for new health behaviour is also needed.

Predisposing factors. The I-Change Model assumes that these motivational processes are determined by various predisposing factors such as behavioural factors (e.g. lifestyles), psychological factors (e.g. personality), biological factors (e.g. gender, genetic predisposition), social and cultural factors (e.g. the price of cigarettes, policies), and information factors (the quality of messages, channels and sources used).

In the I-Change model, intention can be conceptualised in accordance with the Stages of Change paradigm from the Transtheoretical Model. This means that respondents are categorised based on the time period within which they intend to change their behaviour. The Transtheoretical Model states that people in different stages need different interventions to take them to the next stage (and eventually to changing the behaviour). For instance, preparers (who want to quit smoking within one month) are thought to move

into the action phase when their self-efficacy to perform the behaviour is high enough. This knowledge indicates that different interventions for people in different stages are needed. In Smoke Alert this has been put into practice by using computer tailoring as a method of personalising the smoking-cessation intervention for each participant.

Computer tailoring can be used to provide respondents with personally adapted feedback about their smoking behaviour, determinants of this behaviour and skills to change the behaviour [15]. Computer tailoring requires three elements [16]: 1) a screening instrument that assesses the behaviour and the most important determinants of the behaviour, 2) a message file containing education messages tailored to all possible screening results and 3) a computer program that combines the individual screening results with the correct messages from the message file [17]. The messages selected for a specific person are assembled in a logical order and delivered to the person in a personalised letter, or via the computer screen.

In addition to its potential to effectively reach large groups of people in a cost-effective way, there was a second reason for using computer tailoring as a method in Smoke Alert. The results of focus group interviews that were held prior to developing the Smoke Alert intervention [18] revealed that Dutch adolescents preferred information about smoking cessation that was very personally relevant to information that was general. Furthermore, they prefer not having their teachers give smoking-cessation lessons, because they do not consider them to be reliable experts, and their advice may be in conflict with their own personal behaviour. Therefore, Smoke Alert was developed as a web-based cessation intervention that can be carried out in schools, but requires no interference or specific knowledge or skills from teachers.

3.3 Structure of the intervention

The Smoke Alert intervention is a computer-tailored smoking-cessation intervention in which adolescents received three personal pieces of advice over a period of six months. During regular class hours, students went to a computer room supervised by a teacher and filled in an online questionnaire. When logging in to the Smoke Alert website, respondents filled out a questionnaire about smoking behaviour and smoking-related cognitions (e.g. attitude, social influence, self-efficacy).

The Smoke Alert questionnaires were updated versions of previously used questionnaires [19, 20]. The following items were measured by the questionnaire:

Smoking Behaviour. Students were asked to pick a statement that best described them out of nine smoking-related statements. Self-reported smoking was, consistent with previous literature, cross-validated using an algorithm consisting of four additional concepts measuring current smoking, number of cigarettes, and lifetime smoking. In case

of incongruent answers, students were given the most unfavourable response [20]. Students were categorised as daily, weekly or occasional smokers. Nicotine dependence was measured using the modified Fagerström nicotine dependence scale [21] with scores ranging from 0 to 10 and a score of six or higher indicating nicotine dependence.

Smoking-related cognitions. Three social cognitive concepts were measured according to the I-Change Model: namely attitude towards smoking and quitting, self-efficacy not to smoke and perceived social influence, consisting of social pressure, social modelling and social norms. Attitudes were assessed by 26 items that measured the pros and cons of smoking. Perceived influences from the social environment were measured by 24 items that assessed social pressure, social modelling and the social norms of important people in the environment (parents, siblings, best friend, peers and boyfriend/girlfriend). Self-efficacy was measured with 13 items via which students could indicate how sure they were that they could refrain from smoking in certain situations [20]. Three scales were identified through factor analyses: social self-efficacy, situational self-efficacy and stress self-efficacy.

Intention to quit. To measure intention to quit smoking, students were asked to select a statement that best described their situation with options ranging from "I want to quit within a month" to "I have no intention at all to quit". This variable was recoded into a dichotomous variable based on the distribution of respondents among the answering options (intention to quit within six months = 1, no intention to quit within six months = 0).

Action Plans. Smokers were asked to indicate to what extent they planned on using certain strategies when quitting smoking. For instance: the use of nicotine replacements, reading information on quitting, informing friends about their quitting attempts etc.

Other factors that were assessed were age, sex, ethnicity, religion, and educational level.

After filling out the questionnaire, respondents received a personal piece of advice regarding their smoking status and advice on how to be more successful when attempting to quit. The general outline of the first piece of advice will now be described in order of appearance in the tailored piece of advice.

Feedback on smoking status. The feedback started with a personal greeting that contained the name of the respondent. The smoking status of the respondent was confirmed as well as the possible intention of the respondent to quit smoking (e.g. "Dear John, you have been a smoker for four years now, but you say you want to quit smoking within the next month").

Attitude. After giving feedback on smoking status and intention, some paragraphs were dedicated to beliefs about smoking and smoking cessation. The respondent's beliefs were

presented as a balance. It was shown whether he or she perceives more, less or an equal number of advantages and disadvantages of smoking and smoking cessation. Six beliefs were examined more thoroughly. The respondent's opinion of each belief was stated and commented on. This had the general intention of countering beliefs about the positive effects of smoking (e.g. smoking makes me more attractive, smoking makes me popular) and to strengthen beliefs about the negative effects of smoking and the positive effects of smoking cessation.

Social influence. Questions and feedback about social influence were divided into three categories: social pressure, social modelling, and social norms. The respondents had answered questions in the questionnaire about perceived social pressure from people in their environment (parents, siblings, friends). Depending on the amount of pressure perceived by the respondent and the people he or she perceived pressure from, skills were taught to deal with social pressure to smoke.

With regard to social norms and social modelling, the number of people in the environment of the respondent who smoke was calculated. It was made clear to the respondent how many people in the environment are smokers and how this could affect the smoking behaviour of the respondent. In this section the respondent was taught how he or she can ask for support from friends and family when attempting to quit and how this support can be used in becoming a quitter.

Self-efficacy. When filling out the online questionnaire, the respondent answered questions about the self-confidence to refrain from smoking in certain situations. These situations can be divided into three types: stressful situations, like feeling stressed, nervous etc; situational, defining situations that are linked to smoking behaviour like doing homework, during school breaks etc; and social: referring to situations that involve other people like being with friends, or when friends offer cigarettes. For situations where the respondent expected difficulties in refraining from cigarettes, strategies were offered to help the respondent to get through these situations without relapsing.

Action plans. Respondents had to indicate to what extent they intended to use certain action plans before a quit attempt (e.g. removing all smoking materials from the home, asking friends for support, setting a quit date etc.). The respondent was advised to use action plans and given four examples of action plans that could be useful for that respondent. The main message regarding action plans was: the more carefully you plan and prepare your quit attempt, the better you will be able to anticipate any possible difficulties, the more likely you are to succeed.

The first personal piece of advice could be considered as the major intervention. It contained about four pages of text. After this initial piece of advice, two more pieces of advice were given during the six-month intervention period. This advice was all based on the answers to the first questionnaire. The second piece of advice had a stronger

focus on the influence of the (social) environment on smoking behaviour. Respondents became more aware of the influence of friends on their (smoking) behaviour, but also the influence of media was discussed. The third piece of advice had a stronger focus on relapse and relapse prevention. As smokers generally perceive a lapse as a total relapse, the main message of this last piece of advice was that having a lapse is not as bad as the respondent might think and having a lapse does not mean that the quit attempt has been totally unsuccessful. Advice was given on how to deal with lapses. In both the second and third piece of advice further attitudes on smoking (cessation) were discussed, as well as more information on dealing with pressure to smoke.

3.4 Evaluation results

3.4.1 Participants

The Smoke Alert intervention was carried out in a controlled setting. To assess the effects of the intervention a randomised controlled trial was carried out. The intervention was carried out in schools. In this way the high numbers of students required in order to have sufficient statistical power for the randomised controlled trial could be reached relatively easy and in a short period of time. In the autumn of 2004, 192 school headteachers were invited to participate in the Smoke Alert study. The schools were initially contacted by letter, followed by a phone call in order to discuss participation. Reasons given by schools for not participating were usually involvement in other health education programmes or a busy schedule.

The 27 participating schools were randomly assigned to the Internet condition, the Letter condition or the Control condition. Schools in all three conditions received an explanatory letter and informed-consent forms to be handed out to students and their parents. After filling out the baseline questionnaire, schools in the Internet condition and Letter condition received the intervention respectively through the Internet or by letter. Six months after the baseline measurement, all students were invited to fill out the follow-up questionnaire. This questionnaire consisted of the same items as the baseline questionnaire.

Over a period of three months, the Smoke Alert baseline questionnaire was filled out by 979 smokers aged between 15 and 18 years of age, from 27 schools. The mean age of the participants was 16.7 years. Slightly more than half (58.4%) of the participants were girls and 88.4% were Dutch nationals. Regarding smoking behaviour, the mean number of cigarettes smoked per day was eight. The mean age at which respondents had smoked their first cigarette was 13.9. Mean nicotine dependence, measured with the Fagerström questionnaire [21] was 1.9.

3.4.2 Attrition

Attrition at student level was 50.2%. Logistic regression analyses were performed to check for differences between respondents that dropped out after first measurement and those that completed the first and the second measurement. Students that dropped out of the study were less likely to be girls (OR: 0.38, 95% CI: 0.3–0.5) and to smoke more cigarettes per day (OR: 1.05, 95% CI: 1.01–1.08) but had a lower nicotine dependence score (OR: 0.88, 95% CI: 0.80–0.98). No differences were found with regard to age and religion.

3.4.3 Intervention effects on smoking behaviour

Analyses on the effects of the intervention were conducted on complete cases. In total 496 students completed both baseline and the follow-up measurement at six months. The distribution of daily, weekly and occasional smokers among the three study groups can be seen in Table 1.

	Internet condition (n=179)	Letter condition (n=125)	Control condition (n=192)
Daily smokers	99 (55%)	85 (68%)	132 (69%)
Weekly smokers	7 (4%)	16 (13%)	4 (2%)
Occasional smokers	73 (41%)	24 (19%)	56 (29%)

Table 1: Number of daily, weekly and occasional smokers per study condition

At follow-up after 6 months 17.2% of the baseline smokers in the Control condition had stopped smoking. Quit rates in the Internet condition and Letter condition were higher: 26.8% and 19.2% respectively. The results of the logistic regression analyses are presented in Table 2. The intervention was significantly more effective for the Internet condition compared to the Control condition. No differences were found between the Letter and Control condition, or between the Letter and Internet condition.

	Odds ratio	95% Confidence interval	p-value
Internet vs. Control	1.77	1.07–2.91	.026
Letter vs. Control	1.15	0.64–2.05	.649
Letter vs. Internet	0.65	0.37–1.13	.126

Table 2: Programme effects on quit rates (smokers are coded as 0, quitters as 1)

When examining only the experimental conditions, quit rates were the same for boys as for girls. Of the occasional smokers at baseline 42% was considered a non-smoker at follow-up. The quit rate among weekly smokers was 35%, whereas the quit rate among daily smokers was much lower: 12.5%. This may be explained by the higher nicotine dependence score of the daily smokers (3.0 versus 0.16 for occasional and 0.00 for weekly smokers). Of all smokers at baseline, 29% had the intention of quitting smoking within six months. Of these smokers intending to quit, 35% (n=31) had actually quit smoking after six months. Just as many smokers (n=36) who did not intend to quit had given up smoking at follow-up. All daily smokers that had quit smoking at follow-up had the intention of quitting at baseline, whereas only 34% of the occasional smokers who quit had had the intention of quitting.

3.4.4 Programme effects on smoking-related cognitions

Not only did the Smoke Alert intervention have a positive influence on the quit rates of participants, it also had a positive effect on the smoking-related cognitions. Among students in the Internet condition, significantly ($p < .05$) fewer negative social norms as regards quitting were found when compared to the control group. At baseline there was no difference regarding this item between the two groups. Students in the Internet condition also found that their parents were smoking significantly less than in the Control condition. The increase in self-efficacy to not smoke in difficult situations was significantly larger in the Internet condition, compared to the Control condition.

3.5 Conclusion

The results of this study indicate that the computer-tailored smoking-cessation intervention Smoke Alert is an effective way of helping adolescents quit smoking. The intervention tested two ways of delivering the personal advice to the participants: through the Internet and by letter. Results of this randomised controlled study show that giving personal feedback in a letter does not result in higher quit rates than giving no personal information at all. On the other hand, significantly higher quit rates were seen in participants that had received their advices via their computer screen. Since participants in both the Internet condition reported having read the advice just as often as participants in the Letter condition, an explanation for this result could be the relevance of the topic at the time when participants read the advice.

In the Internet condition, students received their advices immediately after filling out the questionnaire. Filling out the questionnaire had already made them think about their smoking behaviour. The personal advice fitted exactly with their thoughts and opinions at that moment and probably provided more motivation to quit smoking. Participants in the Letter condition received their advice up to three weeks after filling out the ques-

tionnaire. It is conceivable that they had forgotten what they had answered to the questionnaire and possibly even changed their opinion about smoking and smoking cessation. Therefore the advice might have been less personally relevant to the Letter condition and consequently less effective in changing behaviour.

Compared to other interventions, our quit rates are relatively high. Sussman [5] compared 66 smoking-cessation interventions and reported a mean quit rate of 17.2%, which is the quit rate shown in the Smoke Alert control group. One reason for the relative high quit rates can be that we included occasional smokers in our sample and considered students as quitters if they had not smoked during the previous week and were self-reported quitters. Occasional smokers may be the ones that have tried smoking a few times and then decided they did not like it and quit. Adolescents easily drift into and out of smoking status when they are not physically addicted.

Reach of the target group

The target population of the Smoke Alert intervention was 15 to 18-year-old students. Since the Smoke Alert intervention was carried out in schools, it was relatively easy to reach the target population by selecting only those classes with students in the desired age range. Whether or not this group would have been reached just as well if the study population had been recruited through a freely available intervention on a website cannot be concluded from this study. Since Smoke Alert will be adopted by the Dutch Foundation on Smoking and Health (STIVORO), data on this topic might become available later when the programme can be used on the STIVORO website.

Possible improvements

Smoke Alert is a smoking-cessation tool that is very suitable for use in schools. It is very easy to use and requires only one class hour to fill in the online questionnaire. After doing so, participants receive personal advice via the computer (website) or by e-mail. This format does not allow for very interactive communication with the smoker/quitter. A possible improvement for this intervention would be the closer follow-up of quitters to provide them with more support at times when they need it during their quit attempts.

It is also known that adolescents experience withdrawal symptoms and difficult times in social situations during their quit attempts. Smoke Alert could be improved by offering quitters Internet-based and/or in-vivo counselling during their quit attempts. This could still be done in an automated procedure, with computer tailoring as the method of giving advice.

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Smoke-free: An Internet-based smoking-cessation programme for adolescents and young adults

4

4.1 Background

The smoking-cessation programme "smoke-free" (in German "rauchfrei") is delivered via the Internet website www.rauch-frei.info, funded and run by the German Federal Centre for Health Education (FCHE) and is aimed at motivating young people to quit smoking. The programme was integrated into the existing "rauchfrei" website on 23 March 2005. The fully automated intervention is based partly on concepts from Cognitive Behavioural Therapy (CBT) and partly on Solution-Focused Brief Therapy methods and concepts for addictions [3]. In addition, the communication strategies of Motivational Interviewing [4] are also followed in the programme.

4.1.1. Theoretical concept of the programme

Self-regulation and self-control

Kanfer [1, 2] assumes in his learning theory model that individuals are fundamentally able to regulate their own behaviour, whereby they differ in their self-observation, self-evaluation and self-reinforcement abilities. According to the author, the concept of self-regulation is practiced not only in classical therapeutic settings but also in everyday social work, in counselling and in self-help. Self-control is a special case of self-regulation where there is a specific conflict situation, where the individual interrupts his or habitual behaviour in order to reflect (anew) on the given situation and on his or her behaviour. Motivational, cognitive and behavioural processes play a decisive role and form the basis self-control.

Marlatt & Gordon [5] applied the self-control approach to the area of addictions, and in particular the prevention of relapses. According to the authors, sensitisation for risk situations and the development of individual control strategies belong to the most important competences for the successful overcoming of a substance-based addiction.

Short-term interventions

Health-related brief interventions have seen an increase in importance in recent years. This is particularly the case for alcohol counselling [6, 7, 8] and smoking cessation [9, 10]. Health-related brief interventions are mostly based on cognitive-behavioural or systemic solution-focused approaches [3].

Brief intervention programmes are characterised by three main features: 1) all brief intervention programmes have, as the name suggests, a comparatively short timescale. The second feature of brief interventions in the area of substance abuse is closely related to the time-scale and concerns 2) the goal orientation or solution focus of the methodological procedure. Berg and Miller underline [3] in their solution-focused approach the importance of a goal-orientated course of action in the counselling and therapy of people with addictions and outline in this regard a number of "characteristics of well-defined

goals" (54ff.) in the intervention process. According to the authors, clients' goals should be meaningful, as small as possible, concrete, precise and related to behaviour.

The last feature of the practice of health-related brief interventions is 3) the communication of relevant information and goal-based advice. The communication of information is especially important in prevention and treatment because people can only make decisions on their behaviour when they have the relevant information on specific health-related risk behaviours or illnesses.

Motivational Interviewing

The communication concept of "smoke-free" is orientation along the lines of the Motivational Interviewing [4]. As in the above-mentioned cognitive-behavioural approach, the assumption at the centre of this model is that people are able to change their behaviours on their own and without the long-term help of professionals (principle of self-modification). The change process can be supported by various interventions. An empathic basic therapeutic attitude and the strengthening of the client's self-efficacy are important principles of motivational interviewing. In relation to smoking cessation, it is important to give clients feedback that encourages critical reflection of their current situation. It is assumed that motivation to change substance use is dependent of how well the communication principles are implemented.

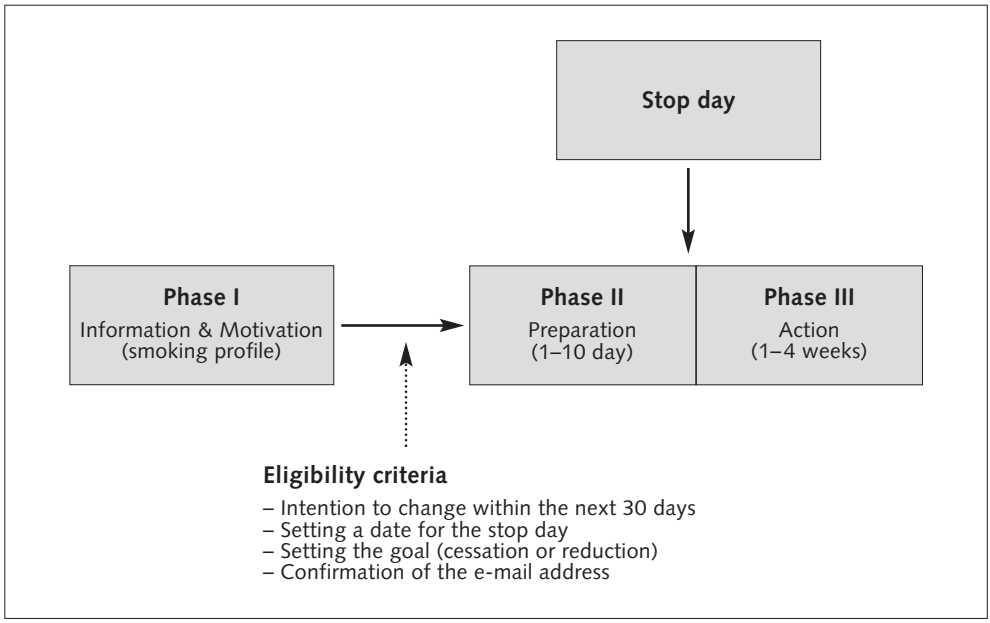


Figure 1: Phases of the Internet-based "smoke-free" programme

4.1.2 Structure of the programme

The fully automatic cessation programme is divided into three phases (Figure 1, page 49), which are explained below.

Phase I – Information and Motivation

During the first phase of the programme the participants create a "smoking profile", in which a number of questions on smoking behaviour are asked (e.g. frequency and intensity of smoking, risk situations). Based on this profile, individualised feedback is generated with the aim to encourage the participants' self-critical reflection of their own cigarette consumption and motivate their participation in the programme. Users who intend to change their smoking behaviour within the next 30 days can register in the programme by defining their own goal – cessation or reduction – and day X when they want to reduce or quit smoking.

"Success stories" from previous participants can also be found on the homepage (Figure 2). Thus, interested individuals can learn about the programme and understand how others have managed to become "smoke-free". Successful, i.e. smoke-free, participants are regularly contacted by e-mail and asked to document their "success story" with the help of a short questionnaire. These "stories" are shown with a picture of the author in a

Figure 2: Homepage of "smoke-free" with embedded success story

"teaser" embedded in the homepage, whereby each time the page is opened a story is randomly selected from the archive in order to give more variety to the homepage. The full-length "success story" can be opened with a mouse click.

Phase II – Preparation

The second phase of the programme is the preparation for day X, when the participants quit smoking or substantially reduce their consumption. The preparation phase contains a guided tour in which various aspects of quitting or reducing smoking are explained and useful tips and advice are given (see overview in Table 1). Here the participants are, for example, asked to select a friend as a "buddy". The "buddies" are sent – also automatically – an e-mail from the programme, in which there are informed about what they can do to support their friend with quitting or reducing smoking.

• Forum	• Rewards	• Emergency plan
• Risk situations	• Diary	• Downloads
• Buddy	• Tips & tricks	

Table 1: Elements of the preparation tour

One of the most important elements of the preparatory phase is the "risk situations". Here the participants are asked to develop coping strategies for the personal risk situations identified in their smoking profile. To stimulate their reflection and to help them generate ideas, the participants are presented with examples for each risk situation. These were developed on the basis of real strategies from other participants. With a click of the mouse these can be added to the personal list and adapted to suit the individual.

In order to further support the use of the single components of the programme a "browser start page" (Figure 3, page 52) was established in 2007. This is a page the participants can open via a link and set up as the start page for their browser (e.g. Internet Explorer). In this way, the participants can be reminded of "smoke-free" each time they go online and can access the programme components relatively easily. In 2008 the browser start page was relaunched and is now called "my smoke-free" (German: "mein rauchfrei"). It can be used as a personalised entry into the programme.

In addition to the fully automated help with stopping smoking, the programme contains a forum in which all participants can discuss and share ideas with each other. Users of www.rauch-frei.info who are not registered in the programme can also take part in the forum. The forum is monitored through a daily control of the postings, but there is no moderation.

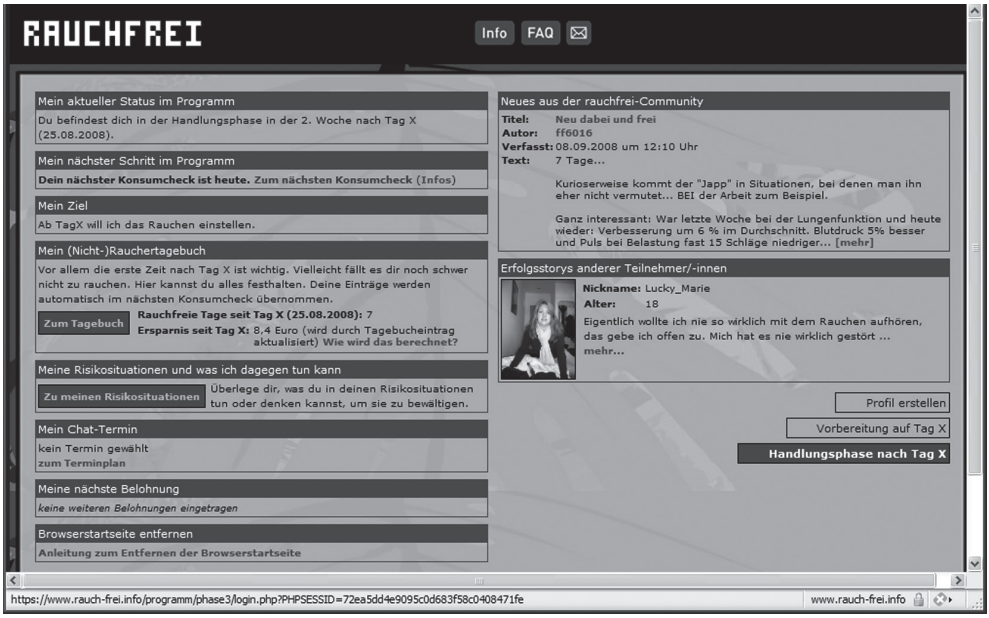


Figure 3: Example of the homepage "my smoke-free" (screenshot)

Phase III – Action

The third phase of "smoke-free" – the action phase – begins with day X and lasts for four weeks. Every week users are sent an e-mail inviting then to visit the website, where they are asked to complete a short questionnaire on their current consumption. During these "check-ups" participants are also asked to state in which situations they relapsed or have smoked more than intended (goal reduction). Based on the updated non-smoker or "relapse" profile the users then receive individual feedback that affirms their previous success or encourages them to have another go at quitting or reducing smoking. Information and tips on how they can cope with their individual risk situations are also given here.

4.1.3 Further information

The programme is part of the main page www.rauch-frei.info and promoted using commercials in cinemas and adverts in teenager magazines. It is free and its use is unrestricted.

As mentioned above "smoke-free" is a "tailored intervention" that includes various consumption-related variables such as the number of cigarettes or the type of risk

situation on which differentiated feedback is based. Gender and age are other variables that influence the choice of wording and content. For example, users under 16 are given the advice to quit with the additional information that at their age it is easier to quit than it is for older people.

4.2 Evaluation

The "smoke-free" programme is continually monitored and evaluated, whereby during the first years the focus was particularly on acceptance among users and the usability of the programme. Between March 2007 and August 2008 a randomised controlled trial (RCT) on the effectiveness of the programme was carried out. The main results of the RCT study and the continual monitoring are presented below.

4.2.1 Participants

The "smoke-free" programme has open access, i.e. it can in principle be used by anyone who wants to quit or significantly cut down their smoking, although young people under 18 are especially targeted by the embedding of the programme in the teen website www.rauch-frei.info and its promotion in teenage media. However, young people under 18 represented only a small percentage of total users. Young adults represent the main group of users and the average age (median) was 24 years (Table 2). User gender was fairly balanced with only a slightly higher percentage of male users (52.6%).

		"smoke-free" (n=6,399)
Sex	male	52.8%
Age	up to 14 years	2.8%
	15–17 years	15.5%
	18–20 years	14.9%
	21–23 years	13.8%
	older than 23 years	53.0%
	Median	24 years

Table 2: Age and gender of the users of "smoke-free" (2003–2008)

However, in order to ensure that the control group did not come into contact with the smoke-free website, the participants for the randomised control trial were recruited from a different website, www.drugcom.de. This website is an information and advice portal on legal and illegal drugs for teenagers and young adults.

	IG (n=144)	CG (n=193)
Male (%)	56.2	53.9
Age (Mean)	26.9	25.3
(Standard Deviation)	(9.8)	(8.7)
Nicotine addiction (HONC) (Mean)	7.4	7.0
(Standard Deviation)	(2.1)	(2.2)
Cigarettes or tobacco products/day (Mean)	14.1	12.7
(Standard Deviation)	(8.8)	(8.9)
Smoking days in the last 30 days (Mean)	27.8	27.0
(Standard Deviation)	(5.8)	(6.4)

Table 3: Baseline characteristics of the RCT sample

As the results of the randomised control trial will be presented in the following, the age and gender of the participants of this sample are shown in Table 3. Whereas the average age was slightly higher than that of the users of the "smoke-free" website, the gender ratio was comparable (Table 3).

All the participants smoked at the time of the first assessment, i.e. they had smoked cigarettes or other tobacco products like cigars, cigarillos or hookah (water pipe) within the last seven days. In the control group 32.5% have smoked other tobacco products, whereas in the intervention group only 12.5% have done so. The participants were randomly assigned to either the intervention or control group. There were no statistically significant differences between the intervention and control group in the socio-demographic or smoking-related variables at the pre-intervention assessments.

Although smoking behaviour was higher in the intervention group than in the control group, the difference in the addition level, the quantity of cigarettes or other tobacco products consumed, and the number of days when cigarettes were smoked over the previous 30 days did not attain statistical significance.

However, due to selective drop-out the control group was on average 4.2 years younger than the intervention group at the post-intervention assessment four weeks after registration, i.e. relatively more young people took part in the second assessment in the control group. At the follow-up assessment after three months, there were no differences in age between the two groups. Due to the differences at the second assessment, age was included as a control variable in the analysis of variance. All individuals who reported

having used other cessation aids, such as self-help books, nicotine replacements, medication, cessation courses or other Internet sites at the post- and follow-up assessments were removed from the analysis.

4.2.2 Programme usage

From the online start on 23 March 2005 to the end of November 2008 a total of 6399 people had registered with the programme. There are currently about 160 new registrations per month. All registered participants complete the smoking profile and, after confirmation of their e-mail addresses, are taken on a preparation tour in which they are shown important aspects of smoking cessation (see section 4.1.2).

The use of the preparatory elements by the participants to the "smoke-free" intervention group is illustrated in Figure 4.

The results shown in Figure 4 also indicate the order of the elements in the preparation tour, with the forum at the start and the download section at the end of the tour. Sixty-six percent of the intervention group began the tour with the introduction to the forum. The percentage of users fell slowly as these worked through to the final element, which was nevertheless opened by at least every second user. Overall, the intervention group used on average (median) six of the eight elements of the preparation tour.

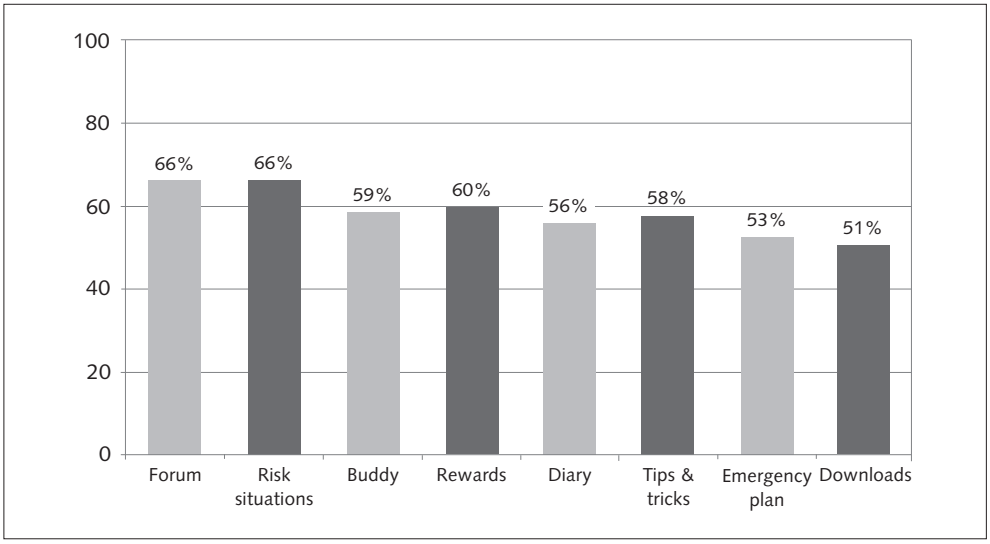


Figure 4:Visits to the elements of the "smoke-free" preparation tour (n=144)

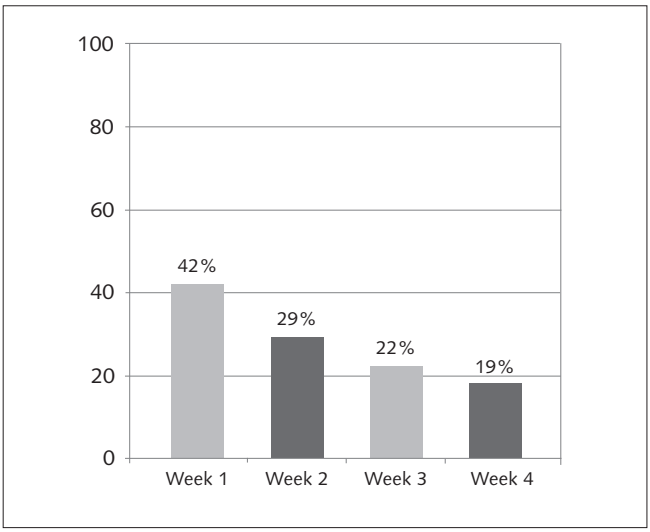


Figure 5: Visit of weekly check-ups after stop day (n=144)

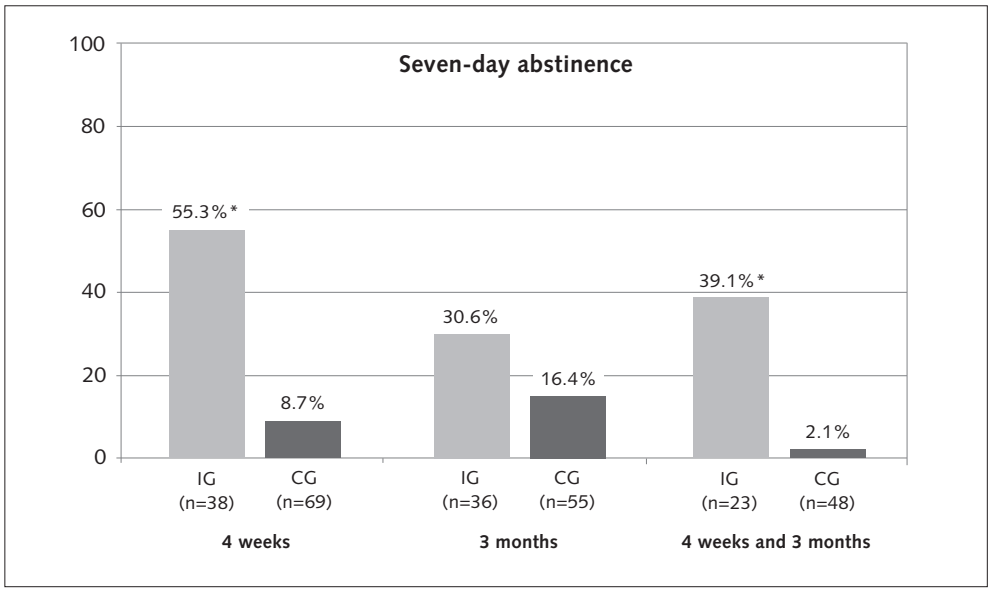
After "day X" 42% of the "smoke-free" participants took part in the first check-up (Figure 5) one week later, when participants receive individualised feedback regarding their actual smoking status. Over the following weeks, the percentage of participants using the check-up sank continually. Only 19% of the "smoke-free" participants of the RCT study used the programme fully and took part in the fourth check-up.

4.2.3 Intervention effects

Four weeks after the stop smoking day ("day X") there was a seven-day abstinence period in 53% of the intervention group (IG), compared to an abstinence of 8.7% over the same period in the control group (CG) (see Figure 6). This difference is statistically significant[1] even after controlling for age. At the follow-up assessment at three months, the abstinence rate was down to 30.6% in the intervention group and up to 16.4% in the control group. This difference is not statistically significant in the analyses of variance, perhaps due to small sample sizes.

According to an intention-to-treat (ITT) analysis in which all the people who did not participate in the assessment were classified as smokers, the abstinence rate in the

1 n=38; OR=12,3; p=.000



* significant ($p < .001$)

Figure 6: Abstinence of participants assessed at four weeks (post) and three months (follow-up)

intervention group was 14.6% after three weeks and 7.6% after three months. In the control group, the ITT abstinence was 3.1% after four weeks and 4.7% after three months.

Looking at the participants who were abstinent at both post- and follow-up assessments, the seven-day abstinence was 39.1% (ITT: 6.3%) in the intervention group and 2.1% (ITT: 0.5%) in the control group. This difference reached statistical significance.

Predictors of abstinence

Given the substantial programme effects after four weeks, the question arises as to which person or programme variables mediate successful abstinence for smoking. However, the results show that only age was significantly related to seven-day abstinence (Table 4). This could be understood as implying that whether a person quits smoking or not is unrelated to both the intensity of consumption and use of the programme. However, it should be noted that the post- and follow-up samples contain many participants who had successfully completed the programme and were already abstinent one week after stopping smoking: i.e. there was a selection of people whose smoking behaviour appears to be relatively independent of the factors studied. Abstinence is probably related to other factors that were not studied here. It should also be noted that the lack of any mediating effects might have been due to the relatively small sample size.

Variable	OR
Age	1.11
Gender	n. s.
Cigarettes/tobacco products per day	n. s.
Nicotine addiction (HONC)	n. s.
Visits to elements of the preparation tour	n. s.
Regular vs. premature end of the programme	n. s.

Table 4: Predictors of abstinence (n=23)

4.3 Conclusion

In "smoke-free" the German FCHE has developed a fully automatic smoking-cessation programme aimed at teenagers and young adults based on cognitive-behavioural therapy, solution-focused and motivational-interviewing approaches. With regard to the teenager target group, it should be noted that "smoke-free" is only rarely used by this age group. Despite promotion in teenage media and the clear orientation of the website www-rauch-frei.info towards teenagers, the main user group is instead young adults. It can be assumed that there is little interest in general for professional cessation programmes in the teenager target group. Studies have shown that most teenage smokers prefer to try and stop smoking on their own [11].

The smoking-cessation programme "smoke-free" was evaluated in a randomised control trial. The main outcome variance, abstinence from smoking, was defined as smoking neither cigarettes nor other tobacco products like cigars, cigarillos or water pipes for a seven-day period. All individuals who at the post- and follow-up assessments reported having used other cessation aids, such as self-help books, nicotine replacements, medication, cessation courses or other Internet sites were removed from the analysis.

At the post-assessment after four weeks, the cessation rate was significantly higher in the intervention group than in the control group. The abstinence rate for the participants who took part in the post-assessment was 55.3% in the intervention group and 8.7% in the control group. The intention-to-treat analysis, which classified all participants who did not take part in the post-assessment as smokers, revealed an abstinence rate of 14.6% in the intervention group and 3.1% in the control group after four weeks. After three months the abstinence rate was also higher in the intervention group than in the control group. At the follow-up assessment the abstinence rate in the intervention group was 30.6% (ITT: 7.6%) and thus almost twice as high as the abstinence rate of 16.4% (ITT: 4.7%) in the control group. However, this difference did not reach significance, which may be due to the small sample size in this study. A power analysis conducted with

"G-Power" [12] prior to the trial estimated a minimum sample size of 50 participants per group in order to detect a medium levelled effect. Unfortunately, this sample size could not be achieved within the timeframe of the recruiting period, because of poor attendance of participants in the study.

Interestingly, the control group improved in comparison with the pre-assessments, although all the participants who used other cessation aids were removed from the analysis. It is possible that the first assessment reminded many individuals of their intention to give up smoking and these then had another attempt at giving up smoking before the next assessment. It is also possible that smokers in the control group avoided taking part in the post and follow-up assessments. Analyses showed that members of the control group who were abstinent from smoking either participated at first or second follow-up, but did not take part in both assessments. Although this possible selection effect is also relevant for the intervention group, an analysis of repeated abstinence could show that there was a significantly higher percentage of abstinent individuals in the intervention group compared to the control group at both the post- and follow-up assessments.

A comparison with other evaluated Internet-based programmes reveals that the three-month cessation rate of "smoke-free" is relatively small. For example, Strecher et al. [13] found a cessation rate of 20% (ITT) in a three-month follow-up for the Internet-based intervention programme "CQ PLAN". In a study on the "QuitNet" programme from the USA, the cessation rate was only 7% (ITT) and thus similar to the current study [14].

However, for a number of reasons the results of "smoke-free" are only conditionally comparable to those of other studies. In contrast to most other Internet-based smoking-cessation programmes "smoke-free" is targeted at a younger population with an average age of 24. Nevertheless, age was shown to be significantly related to smoking cessation. The most important difference to other programmes is the fact that both in the "smoke-free" programme as well as in the evaluation of the programme all use of further supportive measures such as nicotine replacements (NRT) or medication was excluded. It is commonplace that Internet-based smoking-cessation programmes targeted towards adults recommend NRT or other supportive medication [15]. This aspect is important as there are substantial effects for pharmacological supportive measures. For example, in a randomised control trial comparing the use of Bupropion alone or in combination with an Internet-based cessation programme, Japuntich et al. [16] demonstrated no significantly higher cessation rate for the Internet programme.

In sum, despite the methodological limitations of this study, the results indicate that the fully automated smoking-cessation programme "smoke-free" for teenagers and young adults can be an effective support for young people who want to stop smoking. It is an important element in the drive to reducing smoking in the general population. As it is free of charge and can be freely accessed on the Internet, it can reach and thus poten-

tially benefit a great number of individuals. Nevertheless, research in the area of Internet-based smoking-cessation programmes is still in its infancy and further development in this area can only strengthen the importance of the Internet for supporting smoking cessation.

Possible improvements

In general, studies reveal that the effectiveness of Internet-based programmes is related to specific conceptual elements of these programmes. For example, it could be shown that the probability of smoking-cessation increases with the number of individual characteristics of the user that are included, i.e. with the individual tailoring of the programme to the user [17]. In addition, there are indications that the intensity of web use is only conditionally linked to the probability of smoking-cessation.

The self-efficacy expectation of the user appears to be an important mediator as individuals with a low self-efficacy expectation benefit less from an Internet-based programme than those with a high self-efficacy expectation [18]. Because the "smoke-free" programme contains no differentiated strategy to identify and specifically promote self-efficacy, this could be a way to offer a greater amount of "tailoring" in order to achieve a higher rate of smoking cessation.

In addition to the further development of cognitive-orientated tools, other future development could include more emotional elements in the programme. For example, the success stories could play a more central role in order to promote the identification with successful smoke-free individuals. Furthermore, it is important to investigate whether other technologies like videos or mobile phones, which are used by many younger participants, could be integrated. The application of these media could contribute to greater interaction with the website and thus to a more intensive deliberation on smoking cessation.

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The feelok smoking-prevention programme

5

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5.1 Introduction

www.feelok.ch is an Internet programme for adolescents aged from 12 to 18 that aims to promote health and well-being. Eleven topics are covered in feelok: alcohol, profession, physical activity, cannabis, nutrition, love and sexuality, smoking, self-confidence and self-esteem, stress and suicide.

Feelok is a multi-institutional intervention – i.e. institutions that are well-known for their expertise in a respective field – are responsible for the quality, evidence-based content and the updating of the programme as regards their topic. The partners are given a login and password that enables them to update the contents of the modules themselves.

Thirty-four institutions support the dissemination of the intervention in a range of settings. Others provide financial support for the project or selected objectives. Some institutions conduct evaluation studies on certain aspects of feelok. The Institute of Social and Preventive Medicine at the University of Zurich is responsible for the coordination and evaluation of the intervention project as a whole and provides support to the partner institutions.[2]

A range of strategies is being used to reach the adolescents for whom the health-based content of feelok is relevant. The programme is being promoted in a range of settings where young people can be found, primarily at school but also in sports clubs and other leisure-based settings. Some adolescents seek advice in professional counselling centres and so feelok also is present there.

Different professionals operate as knowledge multipliers in these settings. To promote the use of feelok in schools, for instance, we work with teachers and the headteachers. Youth workers, sports coaches and boys' and girls' scout leaders are opinion leaders in leisure-based settings. In order to reach these people, a variety of channels are being used. In schools for example, we are collaborating with universities offering teacher-training courses and with a network of school-based federations. "Youth and Sports" and "Swiss Olympics" are the institutions of choice to reach disseminators in sports clubs.

Feelok is particularly suitable for use in schools. A handbook and a great range of worksheets facilitate its use in class. The content is not only presented in plain text but also with the help of various teaching approaches. Games, animations, tests, a discussion forum, videos and assistants thus add a high degree of variety to the programme. Feelok is therefore a suitable tool not only for adolescents who are able to understand complex information but also for those who find it difficult to read long texts.

2 The list of partner institutions can be found at www.feelok.ch/info.htm

For an Internet-based programme like feelok, it is also important that it can be found easily via search engines like "Google". If you enter the keyword "smoking" (in German) into www.google.ch, feelok appears in the first and second position of the results (end of August 2008).

Between 1999 and 2008 feelok was financially supported by five institutions. These are: the Cancer League of Zurich, the Baugarten Foundation, the Swiss Network for Education and Health (Federal Office of Public Health), the Tobacco Prevention Fund, the Vontobel Foundation and the Credit Suisse Jubilee Foundation. Over a period of ten years, CHF 3 million – corresponding to about EUR1.9 million – were invested in feelok.

5.2 Evaluation of feelok

Several aspects of the feelok project and intervention formed the basis for scientific studies. Reports on the following studies have been published to date:

- A needs assessment to investigate whether the schools are interested in Internet programmes like feelok and, if so, what characteristics it should have (1999).
- A review of the use of the Transtheoretical Model of change in relation to stress and smoking including the question of whether this model is suitable as a theoretical framework for an Internet-based intervention (2001).
- The effectiveness study of the cannabis programme (2004).
- An analysis of the feelok user behaviour (2004).
- An evaluation of the effectiveness of the dissemination strategies used to promote feelok (2005).
- An assessment of the acceptance of the feelok design (2006).
- An evaluation of the feasibility of the feelok worksheets (2006).
- A comprehensive analysis of the profile of feelok users (2006).
- A quantitative analysis of the reasons for and against the use of feelok and the way feelok is being used in the school setting, including an appraisal of the intervention and of the potential of various dissemination strategies. This study also assessed the health-related behaviour of the respondents (2007).
- A qualitative analysis of the teachers' use of feelok at school (2008).
- Analysis of change of smoking behaviour after completion of the smoking prevention programme.

All reports, abstracts, publications and summaries can be downloaded free of charge from www.feelok.ch.[3] Reports are in German; other documents are predominantly in English.

3 Link: "about feelok" / "über feelok"

5.2.1 Acceptance of feelok

The acceptance of feelok among adolescents is of particular interest. Several studies evaluated this aspect using various methods. The results consistently point in the same direction: nearly 80% of the adolescents appraise the content of feelok as interesting and the texts as easy to understand. They appreciate that the intervention covers different topics. Over 70% say it is easy to navigate through the website despite the breadth of topics being covered. About two-thirds plan to visit feelok again if the topics of the website become relevant to them and would recommend feelok to friends if they are looking for information that is covered by feelok.

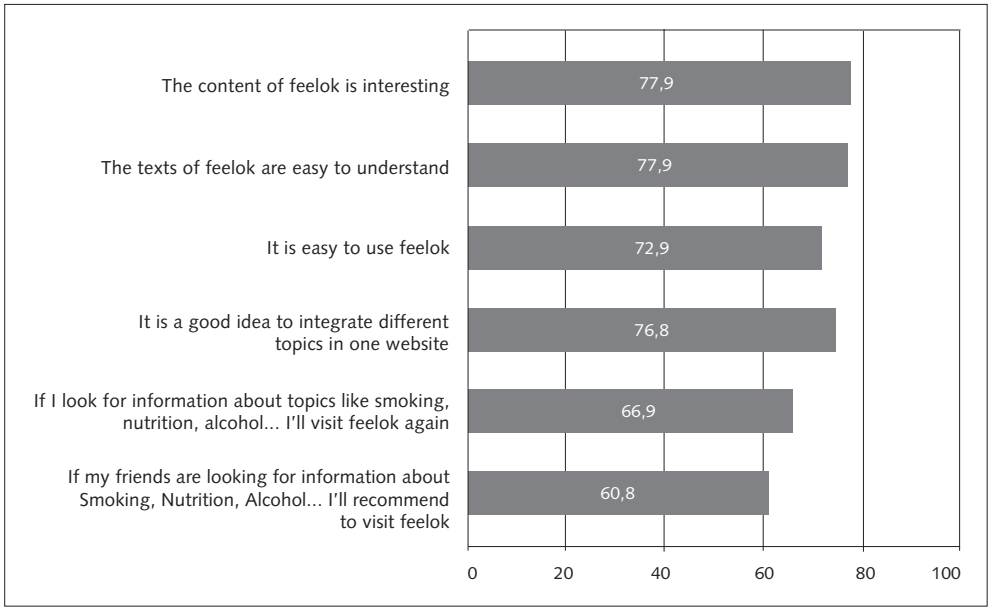

Figure 1: The acceptance of feelok. Presented here are the "Results from an Internet-based study at schools about feelok and about the health behaviour of adolescents"[4]

5.2.2 Usage of feelok & the users' profile

The number of visits to the feelok website is continually increasing. In September 2003 about 400 visits per day were recorded. In 2009 the number of daily visits fluctuated between 1000 and 1300.

4 The complete report of this study can be downloaded in German under www.feelok.ch

Several studies being conducted to analyse the feelok user behaviour show the same pattern: feelok is predominantly being used by adolescents aged 12 to 18 (75%) and somewhat more by girls (60%) than boys. The majority (60%) of the users learned about feelok at school.[5]

5.3 The feelok smoking-prevention programme and its empirical results

Before feelok was developed in 1999, a needs assessment was conducted among teachers and young people. The results showed that feelok should become a multi-dimensional programme focusing on lifestyle issues in order to be able to address the diverse needs of the target group. Feelok was therefore started along with three other modules – stress, self-confidence and sexuality – as well as the smoking-prevention programme. Several studies [1, 2, 3] showed that smoking was often used as a strategy to combat stress, that a lack of self-confidence and self-esteem reduced the motivation and will to stop smoking and that human relationships and relationships problems play an important role in people's smoking behaviour. The feelok programme and its four different modules were thus a product where the findings of lifestyle research were incorporated into the smoking-prevention approach. Based on these considerations, feelok was developed from mid-1999 to the end of 2001 and the smoking-prevention module was launched at the beginning of 2002. Some selected findings of our research on the smoking-prevention programme are presented below.

5.3.1 Smoking behaviour and motivation to change among feelok users

According to the representative SMASH study ("Swiss Multicenter Adolescent Survey on Health", n=7,420, 2002) between 17% (high school) and 30% (vocational school) of 16-year-olds in Switzerland smoke every day. The majority of adolescents do not smoke.

In our study on the profile of feelok users, we placed a selection of questionnaire items from the SMASH study on the feelok homepage. The results showed that 16.5% of the feelok visitors aged 16 to 19 smokes every day. Thus a sizeable segment of the young smokers can be reached through feelok, even though the non-smokers and those who smoke only occasionally are slightly overrepresented among feelok users.

5 Further information about the profile of feelok users can be found in the German report entitled "Erfassung des Profils der feelok-Besucher/innen – Von den methodologischen Überlegungen zu den Ergebnissen" ["Analysis of the profile of feelok users – From methodological considerations to the results"], which can be downloaded from www.feelok.ch

In the same study, respondents who smoked were asked to indicate whether they intended to stop smoking. Answers were grouped according to sex and age. Results show that less than 10% of the respondents are prepared to stop smoking within the next four weeks. About 40% do not want to stop smoking and 40% think they might stop at some time in the future.

Nearly 80% of respondents who do not smoke show no interest in smoking. About 10% think they might try a cigarette at some stage and 10% think they might become occasional smokers.

5.3.2 The stage-matched intervention of the smoking-prevention programme – Structure and user statistics

Our studies show that feelok users are at different stages of change in terms of their smoking behaviour. This finding supports the notion of offering a stage-matched intervention programme.

The feelok smoking-prevention programme is based on an extended version of the Transtheoretical Model of behaviour change (TTM). The original model developed by Prochaska et al. [4] holds that people go through five stages of change from the problem behaviour (smoking with no intention to quit within the next six months) to the desired behaviour (non-smoking for at least six months). These stages can be described as follows:

- *Pre-contemplation:* there is no intention whatsoever to change the problem behaviour within the next six months.
- *Contemplation:* there is a firm intention to change the behaviour within the next six months.
- *Preparation:* there is a firm intention to reach the target behaviour within the next 30 days. Some authors hold that this stage entails first steps towards the target behaviour.
- *Action:* the target behaviour has been adopted yet only within the past six months.
- *Maintenance:* the target behaviour has been maintained for more than six months.

In terms of primary prevention among young people, it is desirable to offer interventions not only to combat problem behaviour but also to prevent it from developing in the first place. Therefore, the group around Prochaska extended the original TTM by three further stages [5]. These three stages are:

- *Acquisition Pre-contemplation (APc):* people at this stage do not have any interest in smoking.
- *Acquisition Contemplation (AC):* people at this stage are considering starting smoking within the next six months.
- *Acquisition Preparation (AP):* The imaginations about smoking have reached a stage where the person has a clear intention to start smoking.

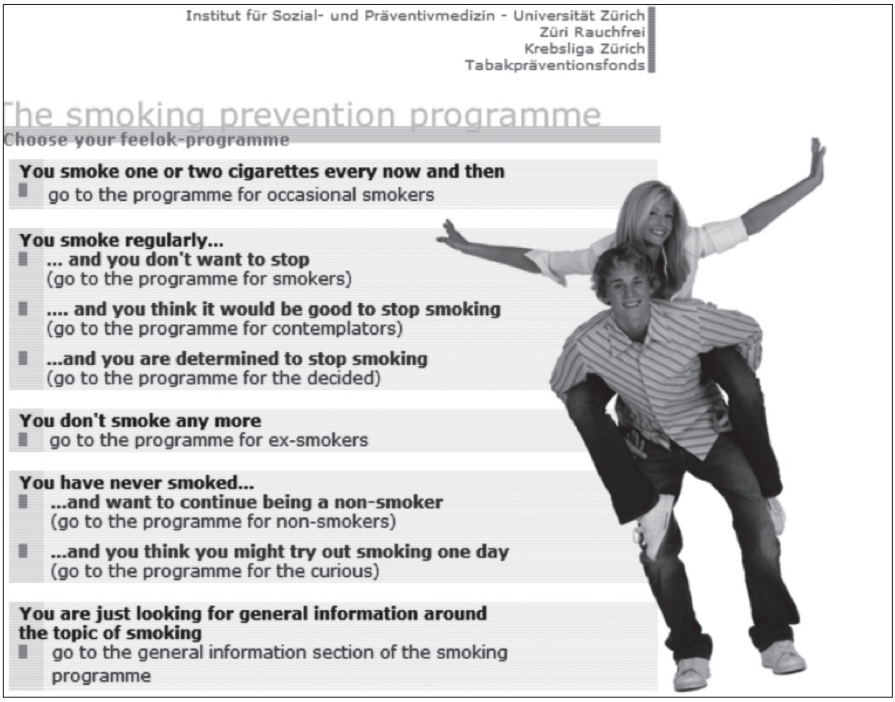

Figure 2: The homepage of the smoking-prevention programme

Between the three stages of Acquisition and the five stages of Cessation there is an additional stage of young people who smoke occasionally independent of their motivation to change their behaviour. The TTM not only describes stages of behaviour change but also the factors that facilitate movement from one stage to another. These are the processes of behaviour change – the behavioural and the cognitive emotional processes – the decisional balance and self-efficacy.

When the feelok smoking-prevention programme was being developed, the nine stages of the TTM and the factors related to the model were tested in a study with 700 adolescents in the canton of Zurich. Additionally, an extension of the model with further elements such as the feeling of helplessness, the barriers of stress, attitudes and social support (to name just a few) was suggested and tested in the same study. Based on the results of this study, the feelok smoking-prevention programme was designed with seven stages of behaviour change with a slightly changed algorithm.[6]

6 For interested readers, the report of this study can be downloaded in German on www.feelok.ch. Link: Infos über feelok -> Rauch- und Stressprävention bei Jugendlichen - Wissenschaftlicher Bericht

Intervention modules for seven different stages of change are offered in the smoking-prevention programme to cater for the differing motivational needs of each group of adolescents. These modules target the following groups: 1) young people who do not smoke and do not intend to start smoking; 2) young people who do not smoke but think they might try it out at some stage; 3) those who smoke occasionally; 4) regular smokers who do not intend to quit; 5) regular smokers who would like to quit; 6) young people who smoke regularly but are committed to giving up and 7) young people who stopped smoking in the past. In addition, a section with general information about issues around smoking is offered (Figure 2, page 69).

Such a differentiated intervention approach is only useful if each module is being visited by the users. Our statistics involving more than 30,000 visits confirm that all seven modules are of interest, yet to varying degrees.

As shown in Figure 3, the highest proportion of visits was recorded for the module for non-smokers who do not want to try out smoking (28%). In second place was the module with information for adolescents who smoke and do not intend to stop (21%). According to the Transtheoretical Model of change, this corresponds to the stage of pre-contemplation. Such a proportion is to be rated as a considerable success as health-promotion experience usually shows that it is very difficult to reach pre-contemplators.

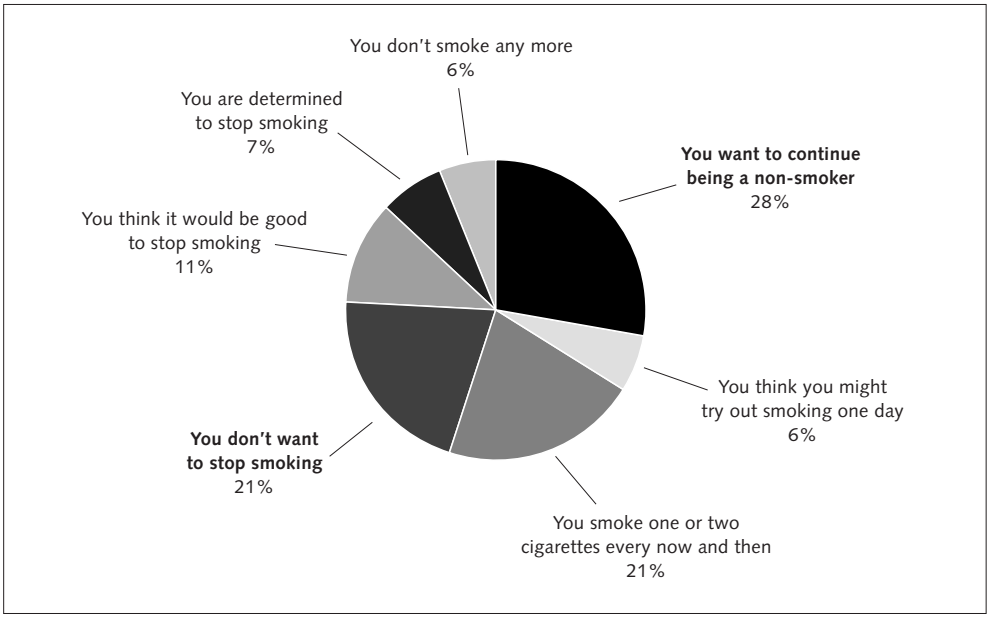

Figure 3: Distribution of visits among the seven stage-matched modules of the smoking-prevention programme. Only visits that lasted at least three minutes are included (n=30,862).

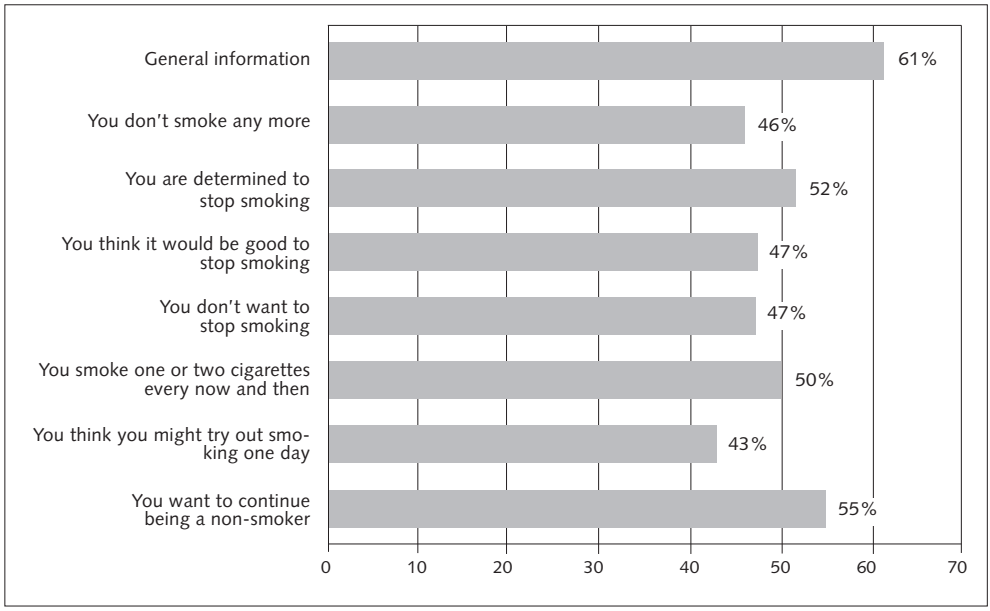

Figure 4: Percentage of real visits (i.e. visits lasting at least three minutes) per module (n=81,395)

The fact that the smoking-prevention programme is often used in class under supervision of the teachers may well explain this positive result. It is possible that these adolescents would not visit the smoking-prevention programme if it were left up to them to do so in their free time.

Figure 4 shows the percentage of visits that last at least three minutes for each of the seven stage-matched modules of the smoking-prevention programme. Only visits to a module that lasted at least three minutes are considered as real visits. Shorter visits are not included in any of our statistics as it is not possible to gain useful information from a module in less than three minutes. Sixty-one percent of the visits to the general section lasted at least three minutes.

Looking at the stage-matched modules of the smoking-prevention programme, we see the following pattern: 43% of visitors to the section for smokers who think it would be good to stop smoking and 55% of the non-smokers stay for at least three minutes. For the other modules, the respective proportions of real visits lie somewhere in between these two values.

The average duration of all visits was 22.5 minutes. Including only the real visits, we see an average duration of 14.6 minutes for smokers who think it would be good to stop

smoking and 21.5 minutes for those who are determined to quit. The duration of visits to the other modules lies in between those two extreme values.

5.3.3 Stage-matched intervention, general information about smoking and the needs of the target group

Scientific evidence from the 1990s has indicated that stage-matched interventions to address smoking behaviour were more effective than interventions that did not differentiate according to the motivational stage of the target group [6, 7]. Results since 2000, however, partially challenge this notion [8, 9]. When we conducted the study "Redesign of an Internet Program for Smoking Prevention as a Result of New Findings", we held the assumption that stage-matched interventions were more effective. We were therefore concerned that two-thirds of the visits to the smoking-prevention programme were recorded for the section of general information around smoking and only one-third of visits targeted one of the seven stage-matched modules (user statistics of version 1 of the smoking-prevention programme).

In order to motivate the adolescents to visit the stage-matched modules, the section with general information was removed in version 2 of the smoking-prevention programme. However, the number of visits decreased from an average of 948 per month for version 1 to 650 for version 2 (Table 1).

Consequently, the decision was taken to reintegrate the section with general information while the design of the homepage was also changed (version 2.1). The link to the gen-

	Monthly Visits
Version 1 (general & tailored section)	948
Version 2 (only tailored section)	650
Version 2.1 (tailored & general section)	996

Table 1: Monthly number of visits for versions 1, 2 & 2.1[7]

7 Data collection version 1: September 03 – September 04 (n=10,074)

Data collection version 2: January – April 05 (n=3,264) – standardised data

Data collection version 2.1: Mai – June 05 (n=3,279) – standardised data

The table shows only visits of the smoking programme, which last at least three minutes and a maximum of four hours.

The number of visits to the feelok programme as a whole varied slightly between the periods of data collection for the three versions of the programme. This variation was accounted for by standardising the number of visits, which was possible because the proportion of feelok users overall choosing the smoking-prevention programme remained constant throughout the three evaluation periods.

eral section was now placed at the bottom of the homepage, after each link to the seven stage-matched modules (see Figure 2). The reintegration of the general section resulted in an immediate increase in the number of visits from 650 for version 2 to 996 for version 2.1 (Table 1).

The redesign of the starting page succeeded in directing more visitors to the stage-matched modules as now 72% of the visits were recorded for the stage-matched modules together compared to only one-third for version 1 of the smoking-prevention programme (n=42,785).

It can thus be concluded that the majority of users are interested in the stage-matched information but not all of them. Whatever the reasons may be, some users prefer to only read general information and do not want to select one of the motivational stages. If a general section is not offered, these users prefer to leave the website altogether.

5.3.4 Study: Change of smoking behaviour after participating in the smoking prevention programme

For the duration of two years, the link to the study was placed on the feelok homepage in a prominent position. If a person was interested in participating, he or she was

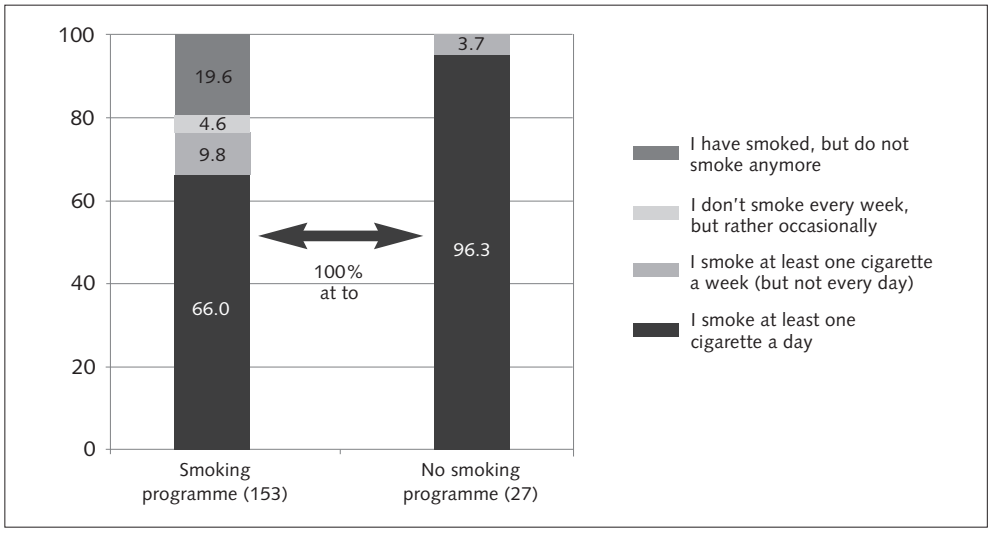

Figure 5: Change of smoking behaviour of daily smokers at t1, filtered at t0 for those who participated in the smoking prevention programme (programme) compared to those who did not participate in the programme (no programme) (n in brackets).

informed that the aim of the study was to assess the health behaviour and user behaviour of the participants. He or she then filled in a short Internet-based questionnaire and left his or her e-mail address. Afterwards, the person could work with feelok. Those who did not want to participate in the study could access the feelok website without restriction.

Three days later, participants received an e-mail asking them to fill in a second questionnaire, the intermediate questionnaire. They stated which module of feelok they had worked with and for how many minutes. One month later, participants received the follow-up questionnaire, which was the same as the baseline questionnaire.

The current study produced multiple findings. (n=1,125; 64.8% girls, 35.2% boys; age range: 13 to 24 years; mean age: 16.7 years). In the following section the two most important findings will be specified:

Daily smokers

Almost 20% of the users of the smoking prevention programme did not smoke one month after the intervention and 14% smoked weekly or monthly. Among the non-users of the programme 96% still were daily smokers one month after the intervention (Figure 5, page 74).

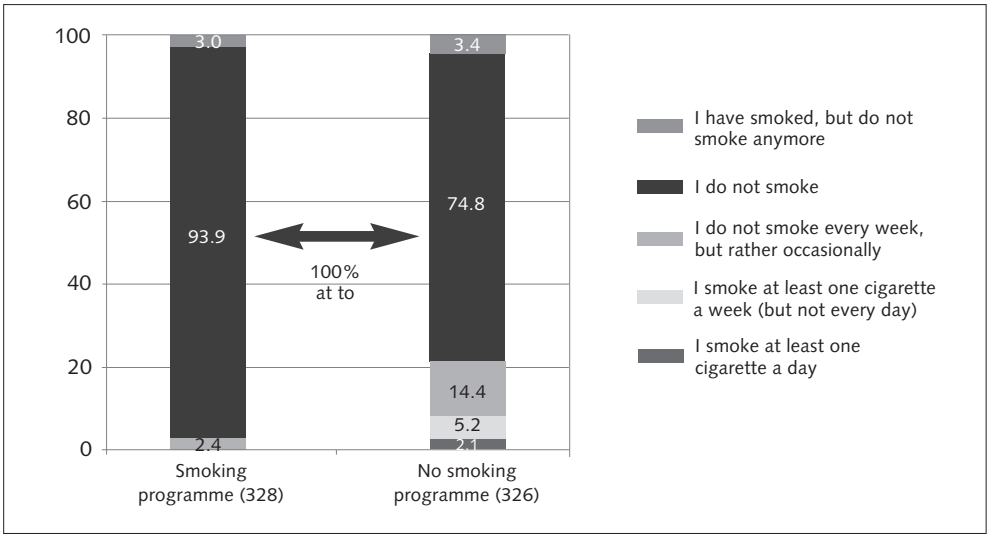

Figure 6: Change of smoking behaviour of non-smokers at t1, filtered at t0 for those, who participated in the smoking prevention programme (programme) compared to those, who did not participate in the programme (no programme) (n in brackets).

Non-smokers

One month after the intervention, 97% of the users of the smoking prevention programme still did not smoke. Among the non-users of the programme, 78% no longer smoked, 22% smoked monthly and weekly and the smallest number smoked daily (Figure 6).

5.3.5 Other strategies to prevent smoking

The smoking-prevention programme is the main application of feelok for promoting smoking abstinence. However, feelok offers other tools and services to help young people give up smoking. These include:

The game "battleships": this game aims to capture the adolescents' interest in all the topics offered by feelok (including smoking prevention). The player has to give correct answers to questions on any of the topics in order to be able to take a shot at the enemy's battleships. The questions are linked with the corresponding information in feelok so that the player can always find the answers that help him or her succeed in the game.[8]

The "body talk" application: this application offers a collection of interviews with adolescents on a range of topics including smoking, cannabis and drinking alcohol. Teachers can use these interviews and accompanying educational materials to discuss the respective topics in their class.[9]

Projects for schools: nearly all smoking prevention and health promotion projects face the problem that they need to invest a lot of resources in order to gain entry into the school system. Feelok has integrated a project database for schools to facilitate the work of health project leaders. "Projects for schools" is a new platform that links service providers with decision makers at schools, which works as follows:

- Health promotion projects are described in feelok.
- Teachers and headteachers find information about different projects and the contact details of project leaders, which help them implementing the projects of choice at their school.

External institutions can also advertise their smoking-prevention projects through feelok in order to attract the schools' attention.[10]

8 Link: www.feelok.ch/schiffeversenken

9 Link: www.feelok.ch/bodytalk

10 Link: www.feelok.ch/pDb.htm

5.4 Future outlook and conclusion

5.4.1 The new smoking-prevention programme – version 3 and the concept of "shared applications"

With financial support from the Tobacco Control Fund, the current version of the smoking-prevention programme was evaluated by an external institution with a formative ex-post-evaluation with 12 school classes. Qualitative as well as quantitative methods were used for this evaluation. Subsequently, ideas for the new smoking-prevention programme were tested with a formative ex-ante evaluation among six school classes. Both studies formed the basis for the evidence-based development of the smoking-prevention programme – version 3.

In addition, a steering group of representatives from institutions active in the field of smoking-prevention was formed. The development of the smoking-prevention programme is supervised by this group of experts.

Version 3 of the smoking-prevention programme is innovative in its concept of "shared applications": attractive existing smoking-prevention tools from other websites can be integrated into feelok. Likewise, feelok tools and services can be integrated into other Internet programmes. In this way, not only all partners but also the adolescents benefit: through the shared use of existing and new applications by various website providers, the cost of development is reduced and the probability that a higher number of adolescents becomes aware of these services is increased. Reduced costs and higher reach of the target group are the aims followed by the concept of shared applications.

5.4.2 Conclusion

Preventive measures are often focused on one type of behaviour only and offer very specific solutions. From the target person's perspective, however, one specific type of "problem behaviour" is not an isolated unwanted phenomenon but instead is part of the person's overall identity and lifestyle – be it more or less coherent. This means that smoking-prevention should also include measures that address further areas of a target person's life, as shown with the following examples: many smokers are worried about gaining weight after quitting: smoking prevention should therefore include issues concerning nutrition, physical activity and alcohol abuse. People often smoke to relieve stress or to be social. The topics of stress and social competence are thus also relevant to smoking prevention. A lot of smokers take a cigarette as a reward, be it at the end of a working day or to combat boredom. Tangible and useful alternative strategies to achieve a better quality of life are therefore an important element in addition to various other smoking-prevention strategies.

Smoking prevention thus needs to take a multi-dimensional approach involving interdisciplinary efforts. Smoking prevention experts need to work together with professionals in the areas of nutrition, physical activity, stress, self-confidence, quality of life, alcohol, human relationships etc. in order to be able to offer a comprehensive smoking-prevention programme. Therefore, feelok was designed as a networking product that encompasses a variety of aspects related to smoking prevention.

Feelok shows that it is possible to build a network comprising various institutions and develop a joint product that covers a variety of themes. Any one single institution would not be able to offer such a programme alone. This fact is probably the most notable success of feelok and is responsible for the high frequency of visits and remarkable user statistics.

The institutional challenge for the future is to keep the network running as a flexible live organism despite the fluctuation of staff and frequently changing priorities in society. In addition to the institutional perspective, the technical developments of the Internet must be closely observed, and the product needs to be continuously adapted to remain attractive to adolescents and schools, even if the resources available are limited. History shows that a popular Internet programme can be forgotten within a few years. Therefore, an Internet-based intervention needs not only to be updated by experts to keep the content at a professional level but also needs to be developed according to the changing potential of the Internet. Continuous involvement in "Internet" and "prevention" topics, long-standing expertise in relevant fields and continuous upgrades of the product are thus necessary requirements to maintain the standard of the programme.

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Happy Ending: The significance of age for treatment efficacy and intervention adherence

6

6.1 Background

Happy Ending (HE) was developed over a three-year period and launched on the Norwegian market in 2003. The main architects of the programme are Professor Pål Kraft and Harald Schjelderup-Lund. Developing the intervention was mainly a private initiative. The Norwegian directorate for health and social affairs, however, contributed with some funding at an early stage, and the Norwegian research council has provided the funding for a research project. The latter includes the position held by the author of this article at the University of Oslo. The results of the research that I have carried out are owned by the University of Oslo, and I declare to have no financial interest in the intervention.

In 2006, HE was licensed to the pharmaceutical industry. Today several interventions that are based on HE are available on the commercial market throughout the world. These versions are similar, but not identical to HE (e.g. some of the telephone components etc. have been removed), and these are marketed as an adjunct to medication products, using other brand names than HE (e.g. Get Quit, Life Rewards, and Active Stop). This article, however, is only concerned with the original Norwegian version – which is the only version that is actually called Happy Ending. This version is still run by the developers, and is commercially available on the Norwegian market. Since 2003, approximately 3600 persons have utilised the intervention.

The target group of the intervention is smokers – in all age groups – who are already motivated to quit smoking, i.e. HE is a volitional intervention not a motivational intervention. Participants are charged for their participation in the intervention. (The participants in the research studies are of course not charged for their participation.) There is no restriction as to who may use the programme: it is open to all.

HE has been advertised in various media, including television commercials, Google ads, a dedicated website, newspapers, and online-newspapers. Additionally, the intervention has been marketed to private companies, and been made available to employees who smoke.

6.2 Theory and structure

The most important theoretical concepts that form the basis of HE include: relapse prevention and tunnelling. These concepts are briefly described below as well as a description of the structure of the programme. A more thorough description can be found elsewhere [1].

One of the most striking features of HE is that the intervention is tunnelled [2], i.e. the intervention is organised as a "guided tour" through a predefined sequence of content, where each piece of information is available to the client for a restricted period of time.

Over a period of six weeks the client receives an e-mail with a link to a webpage, which is unique to that day and is only available for 72 hours. The link is unique to the user and to that particular day, thus we can accurately trace which of the webpages each user accessed. All users receive the same content, and in the same sequence, i.e. HE is not a tailored intervention. (One could consider the smoking craving helpline and the relapse as a form of tailoring.) During the six first weeks of the programme the client receives two to three text messages (SMS) on his or her mobile phone each day. After this, the number of text messages is reduced to less than one per week. The content of the text messages typically underlines the main message from the webpage of that day, or it may remind the client about using the other features of the programme. HE is composed of three distinct phases: a two-week preparation phase, when the client smokes as usual; a highly intensive four-week active quitting phase; and an eleven-month follow-up phase. During the last phase, the number of contact points is gradually reduced to only one call every Sunday afternoon and one SMS during the week.

The main rationale for tunnelling is that the psychological processes that quitters experience are different across various time points and follow a certain chronology [3–15]. HE attempts to follow such a chronology, and the programme content is organised according to the psychological processes that people experience at certain time points. Additional arguments for applying tunnelling are: increased awareness of one's own quit attempt due to the abundance of contact points; reduced cognitive load on the client, compared to a hierarchical website (because there are fewer degrees of freedom); and the sustained contact makes it possible to continuously monitor the target behaviour of the client and hence making it possible to provide just-in-time relapse therapy.

A central focus in HE is relapse prevention. The approach applied in HE is based on Marlatt's cognitive-behavioural model [16], and self-regulation theory [17]. Most interventions, including HE, address lapse prevention. This is done by: educating the user about potentially challenging situations, installing coping plans and boosting self-efficacy before a lapse actually occurs, and by providing a smoking craving helpline the user can call whenever he or she is tempted to smoke.

We stress the distinction between a lapse and a relapse, and the fact that not all lapses lead to a full-blown relapse. Having a few cigarettes and subsequently continuing the quit attempt is a lapse, while starting to smoke regularly again and giving up the quit attempt is a relapse. Hence, preventing lapses and preventing relapses are not necessarily the same. A crucial ingredient of the programme is the education of the participants about the cognitive, affective, and behavioural reactions that smokers usually experience if a slip occurs. In HE, participants are told that the administrators expect that most of them will experience one or a number of slips [8]. Participants are told that it is not critical whether they experience a slip, but rather, how they react emotionally and behaviourally to slips. Hence, we try to prevent the devastating cognitive and emotional consequences ("snowballing") of breaking zero-tolerance rules [17]. By being prepared

for these reactions, being able to recognise them when they occur, and having specific skills and support systems to master such setbacks, the probability that the self-regulation process will be successful increases significantly [17].

Additionally, the relapse-prevention system continuously monitors the smoking status of participants. For two months post-cessation, the quitters are called each night and asked whether they smoked that day. Then, brief encouragements are provided to abstainers, and therapy to lapsers. The purpose of the relapse therapy is to induce the participant to attribute the slip to situational factors (i.e. an external and unstable cause) as opposed to willpower (i.e. an internal and stable cause), thereby preventing negative emotions and a full-blown relapse. Furthermore, an important element is to make the quitter accept that if he or she relapses and starts smoking again, it is part of a deliberate decision and not something that the person is more or less powerless to prevent.

The last component of HE is the morning call. This call is performed by the client and takes place every morning for two months, starting on the second day of the active quit phase. If the client does not call HE, he or she will receive up to three reminders by phone (one Interactive Voice Response (IVR) call and then two text messages). Upon calling, the client will hear a brief pre-recorded message that points out a positive short-term consequence of quitting, for example: "today your blood pressure is reduced to that of a non-smoker". This information resembles a type of biofeedback, and the topic is further elaborated on the website of the day. This is done to counteract the motivational conflict experienced by many smokers during the first smoke-free days. Along with the temptation and impulse to smoke, this motivational conflict implies that the effect of the expected consequences of smoking versus not smoking tends to change. In short, the positive short-term consequences of smoking (e.g. feeling more relaxed, less irritable) tend to be inflated, while the value of the long-term negative consequences of smoking (e.g. health) seem to be deflated during the first days and weeks of a quit attempt [4, 10, 17].

We stress that each component and each contact point, including the smoking craving helpline and the relapse-prevention system, were 100% automated on the intervention side. The smoking craving helpline and the relapse-prevention system are based on IVR, i.e. the client will hear pre-recorded messages upon calling, and he or she may respond to questions by pressing a button on his or her mobile phone.

Each day of the active quit phase of the intervention consists of multiple contact points that are spread out from morning to evening. After getting up, the client calls the intervention and listens to a positive health message. When the client logs on to the webpage for that day, he or she reads it and completes the daily assignment in the web diary. Throughout the day, the client receives three SMS text messages. Finally, the client is called and asked whether he or she smoked that day. Additionally, the client may have called the smoking craving helpline upon experiencing a grave episode of craving a

cigarette. Usually the different information provided in these various contact points relates to each other, or to the information from the previous or the next day. HE is an intense intervention during the first two to three months, but particularly during the four-week active quit phase. It should be noted that for most of the one-year period of the intervention, the number of contact points is restricted to two per week.

6.3 Evaluation

The efficacy of HE was evaluated in two randomised controlled trials (RCT) [1, 18]. In both trials a treatment group receiving HE was compared to a control group receiving a printed self-help booklet.

Subjects were recruited by means of banner advertisements in Internet newspapers. People who were willing to make an attempt to quit smoking in the immediate future, were aged 18 or older, smoked on a daily basis, and had access to the Internet, e-mail and a mobile phone on a daily basis, were candidates for inclusion in the study. The restriction regarding age was due to ethical requirements and practical considerations (i.e. participation of younger persons would have required consent from their parents, and hence made the recruitment procedure significantly more complicated). It should also be noted that smoking cessation among adolescents has never been the focus of our research, aside from participation in the current workshop. Across trials, subjects on average smoked 18 cigarettes a day, and had an average FTND score around five. Half of the subjects were male, and 45% possessed a college degree.

In trial one, both the treatment group and the control group received free supply of nicotine replacement therapy (NRT), but NRT use was not a prerequisite for participation. In trial two, NRT was not provided to any of the groups.

Seven-day point abstinence was measured at one, three, six, and twelve months after quitting: intent-to-treat principles were applied and the main outcome was repeated point abstinence (RPA) at all these four time points. We applied repeated point abstinence, as opposed to continuous abstinence, due to the heavy focus on relapse prevention in HE: i.e. we expected the HE users to have as many lapses as the control group, but we also expected that the relapse prevention system of HE would stop some of the lapses from developing into full-blown relapses.

The main finding, from trial one (with NRT), was that repeated point abstinence was significantly higher in the treatment group (22.3%) compared with the control condition (13.1%; odds ratio=1.91, 95% confidence interval: 1.12–3.26, n=396, P=0.02) [18]. The main finding, from trial two (without NRT), was that repeated point abstinence was significantly higher in the treatment group (20.1%) compared with the control condition (6.8%; odds ratio=3.43, 95% confidence interval: 1.60–7.34, n=290, P=0.002) [1]. The

effect size (i.e. odds ratio) for long-term abstinence found in these two trials are in the range of those reported in meta-analyses of telephone counselling [19], group counselling [20] and individual face-to-face counselling with smoking-cessation specialists [21].

Due to low number of young subjects, the two trials (n=686) are broken down in the following analysis. Of the total number of subjects, 76 were 25-years-old or younger, and 29 were 21-years-old or younger. This means that we do not really have suitable data to draw conclusions with regard to these lower age groups. The tendency in the data is that higher age predicts abstinence (non-significant): this is true for both experimental conditions. There is a tendency towards higher treatment effects (i.e. odds ratios) for younger age (non-significant). Figure 1 illustrates this tendency. If the cut-off point is set at 21-years-old, the tendency towards a dip in treatment efficacy for the youngest clients becomes more extreme. That is, an odds ratio of 1.08 (95% confidence interval: 0.06–19.05).

I stress that there is no statistically significant difference between the treatment effects in younger versus the older age group (regardless of whether the cut-off point for age is 21 or 25). Moreover, there was no significant difference in drop-out rate from survey follow-up between the age groups.

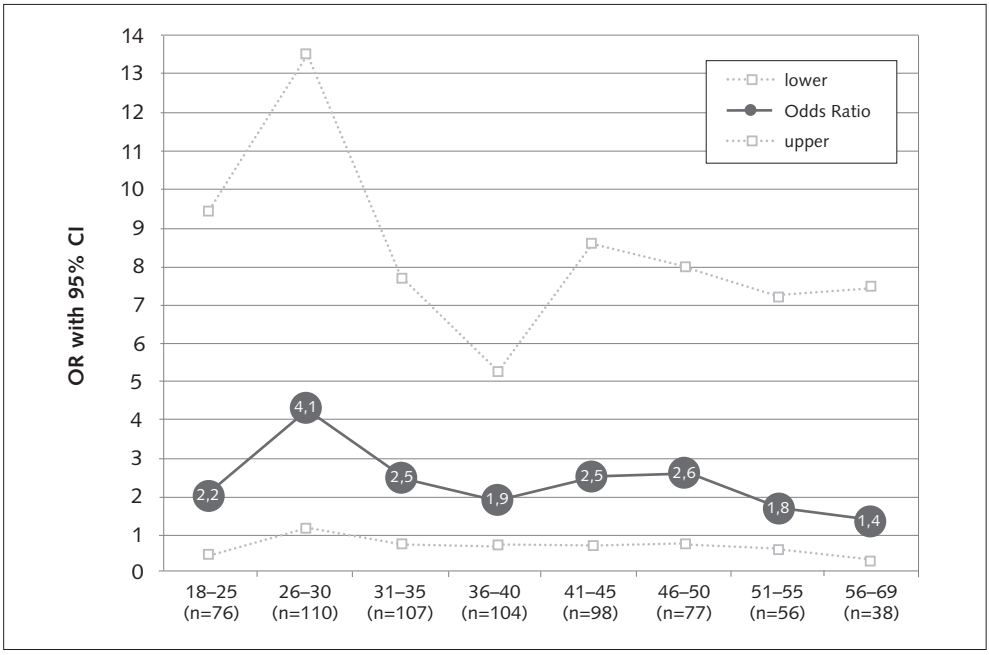

Figure 1: Intervention efficacy across age groups

What was statistically significant, however, was the adherence to the intervention. The younger clients (18 to 21-years-old) utilised HE to a much lesser degree than older clients: younger clients logged on to the webpage on average 17 times (SD=13), while older clients logged on 29 times (SD=13). Theoretical and observed range was 0–44. Similar results were found for the other components of the intervention as well (except for the smoking craving helpline, were no difference was found).

A set of qualitative interviews was performed with HE users. The interviews focused on the user experience of HE. All subjects were males, two were in their early twenties, and three were in their fifties. Two findings from these interviews are relevant in this context. First, the older subjects were in general a lot more positive about the intervention, compared to the younger subjects. Second, both young men raised several critical comments regarding what they saw as "artificial communication" throughout the intervention while the older subjects did not raise such concerns. Examples of such statements were: "I know it's a computer, so I don't care", and "I find it awkward, and a bit silly, to receive text messages from a computer that give oneself out to be someone called Happy". It could be that the younger subjects will be more critical towards web-based interventions in general because they take the technology for granted and are not so easily amused by new media?

6.4 Conclusion and outlook

HE is unique in media approach; i.e. in combining e-mail, web, SMS, and IVR. I believe this contributed to the success of the intervention for several reasons. First, in this way one may exploit the unique characteristics of each channel (e.g. text versus voice recordings, push/pull, short/long texts, availability etc.). By doing so, one may communicate on a broader spectrum, and thereby increasing persuasiveness. Second, different persons may have different preferences regarding channel, and by utilising several channels one may meet these preferences. This assumption is in accordance with what we observed in questionnaires, qualitative interviews and general feedback from the clients. On an overall level, however, we found that clients tended to rate the telephone components (IVR & SMS) of the intervention as being slightly more useful than the web components. Hence, IVR and SMS seem to be a valuable supplement/extension of Internet-based interventions.

As I see it, there are two major achievement of HE: first, it was the first automated digital smoking-cessation intervention to preserve a clear treatment effect over a year (restricting the comparison to volitional interventions and to RCTs applying ITT). Second, the design of the intervention is novel (i.e. the combination of four media channels, and the combination of extensive tunnelling and just-in-time therapy).

The dissemination of the intervention has been challenging due to the advertisement costs being higher than the incremental cost of delivering the intervention. Another

aspect is that the Norwegian market is quite small, and a certain number of users are required to cover the running expenses (e.g. hosting of the webpages and the telephone services). Hence, the business model is currently being reconsidered. It could be that a small private company does not provide a good basis for dissemination, particularly in such a small market. In my opinion, the optimal solution from a public health perspective would be that HE be disseminated by the Directorate for Health and Social Affairs (or a large health NGO), because they already have an organisational infrastructure that is more suited to the large-scale distribution of such interventions.

For the time being, no concrete plans exist for future development of HE. However, several opportunities for improvement exist; some of these are listed below. Tailoring has been shown to improve treatment efficacy for other interventions. Hence, utilising various tailoring strategies might also improve treatment efficacy of HE; either for the target group as a whole, or for specific sub-samples of the target group (e.g. adolescents or low socio-economic status groups; both which are highly prioritised groups, politically speaking). Tailoring is only a reasonable approach, provided that we can identify the most crucial client characteristics. I would like to stress that none of the baseline characteristics (including gender, age, and level of education) moderated treatment efficacy in our trials; hence, we have no empirical basis for stating that these characteristics are relevant for tailoring in future versions of HE.

Another strategy for increasing adherence rates and treatment efficacy might be to extend the interactivity of the intervention. This is to give the client the feeling of being in dialogue with the intervention. For behaviour change purposes, I do not believe in simply providing information to the client (as in a hierarchical website). Instead, the information should be embedded in a context that includes various push-and-pull features, similar to those observed in human-to-human relationships. This is a main argument for tunnelling.

In general, I think that the interventions on the web today do not have enough "push", and I also think that the mobile phone represents the main opportunity for changing this. HE is probably the digital intervention available today that provides the most "push". However, too much "push" will only drive clients away. This has to be balanced against a set of positive user-experiences. Such positive factors include: the intervention should be rewarding to follow; the intervention should be perceived as useful for the client and the client should have a sense of therapeutic alliance and confidence in the treatment provider [22]. For the part of HE, there is probably more to be gained by exploring these factors than in increasing the "push" factors.

From my perspective, having worked with HE for more than three years, I would like to sum up with the following advice to the field of digital behaviour change interventions. A hierarchical website as a stand-alone intervention is not likely to be effective: try to mimic relevant aspects of human-to-human relations in your interventions; make the

intervention rewarding to follow, include "push" factors"; extend the web intervention by use of mobile phones and finally, tunnelling and just-in-time therapy should be considered, particularly for volitional interventions.

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Summary of the discussion: Review of the key topics

This section reviews the discussion that followed the presentation of the interventions. After summarising and comparing their main characteristics, it was debated on how to improve the reach and efficacy of such programmes. Thus, their main features and possible ways of recruitment were debated. Moreover, the theoretical foundation of web-based interventions and questions concerning their future development and research were discussed.

Main characteristics of the discussed interventions

As shown in the previous chapters, there is a wide scope of designing web-based smoking-cessation aids. One reason for these different approaches can be ascribed to the background of the interventions. As with the Danish "Xhale" and the German "smoke-free", the initiative goes back to health politics, i.e. tobacco control policy. In the case of the Swiss site "feelok", the interest was in installing a general tool for education and youth development. Therefore, the smoking-prevention and cessation section in the latter website is accompanied by several other youth-related topics. Though implementation as a cessation tool for the general public is planned, the development of the Dutch "Smoke Alert" mainly goes back to the scientific interest in the effectiveness of computer-tailored interventions. This is also true for the Norwegian programme "Happy Ending". In contrast to the other interventions, it is the only cessation tool that has been commercially adapted and which is not aimed specifically at young smokers.

Regarding the structure of the presented interventions, the considerable heterogeneity must also be mentioned. For instance the entire website of the Swiss intervention "feelok" is fully accessible, i.e. no individual login is needed to access the supportive content. This is only partially true for the other aids. Although general or individual information is also accessible without a personal login (e.g. a self-test on "Xhale" or "smoke-free" or common facts about smoking cessation as on "Smoke Alert"), the main intervention of these tools is located within the personalised section of the site. Although constituting a higher threshold for use, interventions using login sections have the possibility to guide the users more individually through the process of behaviour change.

Among the programmes that have a personalised area, a distinction can be made depending on how directly the users are guided through the programmes. Whereas the participants of the Danish "Xhale" are free to use whichever content they want, for example, the Norwegian "Happy Ending" consequently applies the tunnelling technique – i.e. it leads the participants through the intervention in a predetermined sequence. Both of these options apply to the German "smoke-free". Thus, it offers a guided tour through its content; however, it is possible to leave the suggested path in order to access the respective content individually.

Concerning the length and intensity of the intervention, there is considerable variation between the different programmes. For instance, in the German "smoke-free" programme, users have the possibility to receive up to four tailored pieces of feedback on

their cessation status for the duration of up to four weeks. In the Dutch "Smoke Alert" intervention, there are three tailored messages within six months. The by far most intense contact is provided within the "Happy Ending" programme, which lasts for 54 weeks, providing one new browser-based message every day during the first six weeks, up to three SMS per day in the first weeks after quitting and contact via automated telephone services. In contrast, the Danish "Xhale" intervention leaves the choice of contact much more to its users.

Regarding their current evaluation results, all the presented cessation aids have been shown to be more or less effective or at least to be viewed as useful by the participants. For instance, the "feelok" intervention shows positive data concerning its usage and its acceptance. The German "smoke-free" shows at least short-term effects on smoking behaviour. Evaluation results concerning "Xhale" also suggest that the programme has an effect on smoking behaviour. Thus, its participants were more likely to abstain from smoking after one year than an untreated control group. Concerning "Smoke Alert", the conducted effectiveness study also showed significant effects of the intervention. Treated individuals were significantly more likely to display smoking abstinence after six months than the participants assigned to the control group. The evaluation results of "Happy Ending" point in the same direction; this also applies to the younger age groups, though they perform slightly worse in terms of quitting than the other participants.

Despite these promising results, several challenges in the dissemination and development of web-based cessation aids for young people are obvious. As just a small proportion of the target group makes use of these interventions, one core question concerns their reach – and ways to improve it. Another crucial issue discussed by the round of experts concerned the development of the interventions. Thus, it was debated which programme features should be regarded as relevant and which issues are likely to be important in the future. The theoretical background of web-based smoking-cessation aids for young people was also addressed, as were potential research questions. The main results of the discussion are summarised below.

What means should be taken to reach the target group?

Due to a low risk-perception and the absence of other motivational factors that apply for adults, it was regarded as extremely important to improve the ways of motivating young smokers to use these interventions.

The presented programmes that aim at adolescents and young adults follow different approaches for reaching their target group. Both the "Xhale" and "smoke-free" programmes are mainly promoted by advertisements, press releases and other activities that increase their publicity.

"Smoke Alert" and "feelok", are conceptualised to be adopted during school lessons or in leisure settings. This proactive approach, where the adolescents are directed to deal

with their own smoking behaviour, has the advantage of reaching young smokers who are not yet motivated to quit. Hence, their users' statistics show a considerably higher proportion of younger participants. Although the effect of such a "forced" access is limited (especially among the group of pre-contemplators), it was stated that it helps to increase the awareness of young people and to make the interventions known for later quit attempts.

In addition to guided contact at school or in leisure settings, a variety of other methods are used by the interventions in order to attract the target group. These include events at school or in the community, press releases, television features or participation in other health-related campaigns. The experience of advertising has been ambivalent. Thus, television commercials for the "Happy Ending" intervention reportedly did not have the desired effect. The same applies to advertising for the German "smoke-free" website in a popular youth magazine. Due to the high costs associated with such marketing activities, this is to be regarded as especially critical. In the case of "Happy Ending", banner advertisements in the WWW were more likely to induce the desired effect of increased usage, supposedly because no media change is necessary.

Concerning the ways of addressing young people, the discussion focussed on the critical attitude of many young people towards prevention campaigns. Therefore, it was regarded as important to address young people in a natural and credible way and to use their channels of communication. Thus, it was suggested to promote the programmes in media channels that are popular within the target group (e.g. myspace.com or facebook.com, as practised by "Xhale").

In order to address those who are determined to quit and are actively looking for support, a good ranking in search engines like Google was also viewed as important (as reported in the context of "feelok").

Overall, embedding the programmes into other prevention activities during early adolescence (e.g. at school or at sports clubs) was regarded as particularly useful. Thus it was mentioned that endeavours to increase the utilisation of web-based cessation tools should not only focus on the Internet; "traditional" channels and activities also play a crucial role in increasing the reach.

What features are relevant for the success of a web-based intervention?

Another key question of the discussion concerned the content and the structure of the cessation tools. In addition to delivering supportive information in a brief and concise way, it was regarded as important to express the information as relevantly as possible for the participants. All the described interventions therefore use computer-tailoring methods in a more or less distinct way: "feelok", provides stage-matched information depending on the motivational status of its users, for example; "Xhale" and "Smoke Alert" aim to support their users by tailored messages derived from the users' status from

the time of registration. The German intervention "smoke-free" uses computer tailoring in a similar way, except that it considers not only the participants' input at the beginning of the programme but also data that is collected during the process of smoking cessation.

Customised messages can account for the personal and behavioural characteristics of the participant. For instance, information about the participants' gender can be used to provide him or her with specific messages that account for the different reasons for stopping smoking ("Xhale"); information concerning the participants' self-efficacy can be used to provide coping strategies for critical situations. As in the "Happy Ending" and "smoke-free" interventions, relevant information can also be customised depending on the participants' status during the change process. Acting on the assumption that users need different help at different times, the "Happy Ending" programme consequently applies the tunnelling technique and thus accompanies its users through different stages of the behavioural change with different methods and intensity.

In this context, a critical topic concerns the question of how close the contact between the programme and user should be. On the one hand, close contact provided by a relatively high amount of "push" messages can be regarded as particularly useful and supportive – and has been proven effective as with "Happy Ending". However, a high intensity of e-mail or mobile phone messages can obviously be viewed as coercive and annoying. According to its developer, several users of "smoke-free" expressed their appreciation about the e-mails sent by the programme. They claimed that the e-mails had reminded them to stick to their plan and therefore had been of considerable use. Concerning text messages for mobile phones, the chances of achieving a positive effect were also regarded as substantially larger than the risks of provoking negative reactions. In this regard, it was reported from another cessation programme that participants actually relied on getting their daily text message and thus were disappointed when they unexpectedly did not receive any. Moreover, the heavy use of the SMS option within the "Xhale" intervention also suggests that mobile phone messaging services are remarkably popular. Though there was consensus that a means of ending the programme (i.e. an "exit button") or a possibility of regulating the contact intensity should be provided. However, users who unsubscribe from the programme should be motivated to reconsider their decision.

Is the theoretical background adequate?

The theories applied in the presented interventions all come from the cognitive-behavioural paradigm and mostly are adapted from the treatment of addictions among the adult population (like the Prochaska stage model and its extensions). Theories however that account for the young age of the participants, or the Internet as the location of the intervention are not in use.

As the adolescents' nicotine consumption and their motivation to quit show a much higher fluctuation than is seen in adults, the application of these theories must be

regarded critically. Due to the more dynamic smoking behaviour of young people, specialised theories for adolescents or adaptations from the original adult theories were thus regarded as necessary. In the opinion of the participants, weighting should be set differently in order to account for the motivational differences between adolescents and adults. For instance, the particular importance of social norms with regards to smoking onset and cessation was pointed out.

What are main issues for future development?

Concerning the future of web-based cessation tools for young people, an enhancement of the tailoring algorithms was regarded important. On the one hand, this implies a finer customisation to individual and situational characteristics (like e.g. the motivational status or self-efficacy). In addition, it was proposed to consider new attributes in the tailoring process and to offer specialised content for less-educated people. As stated by one participant, the ultimate goal of tailoring techniques should be to mimic human interaction. Yet it was also noted that the cost-effectiveness of these techniques should be kept in mind. Tailoring should focus on all relevant attributes associated with smoking behaviour.

The growing prevalence of broadband Internet access and multimedia-capable computers plays a crucial role in the further development of smoking-cessation aids. While the cessation aids discussed predominantly rely on text, modern information technology enables increasing implementation of multimedia content like videos or interactive Flash-based features. This could be used to attract sections of the population that are less used to reading and therefore would not make use of cessation aids that mainly rely on text information. Moreover, videos can be used as a means to provide information from real testimonials (e.g. "Xhale") and as a tangible way of describing on how to cope with critical relapse situations (e.g. as planned for "smoke-free").

Moreover, the increasing use of Internet services and multimedia content in mobile devices was also regarded as important for the further development of smoking-cessation aids. Thus, closer contact between user and intervention will become possible, allowing for a more thorough implementation of the concept of "just-in-time interventions" already followed by programmes like "Xhale" and "Happy Ending". A further development of this idea implies that participants can retrieve supportive messages that are not only tailored to the users' characteristics but also to the current situation, providing instant help to cope with potential relapses.

What research questions should be considered in future?

The future development of web-based smoking-cessation aids for young people undisputedly should be supported by scientific research and evaluation. Hence, despite all useful knowledge gained in recent years, it is remarkable that so little is as yet known about the working mechanisms and the effectiveness of this type of intervention.

According to the attending experts, thorough research dealing with the effectiveness of these interventions is needed. This concerns the effectiveness among the programme participants (as in the presented studies), and moreover the overall effect in the targeted population, i.e. the programme impact.

The lack of theoretical background about behavioural change of young people points to another necessary field of research. Thus, it has to be considered whether theories derived from the treatment of adults can be adopted and how they should be modified. Moreover, further research has to be conducted concerning the behavioural and structural determinants of smoking behaviour and behaviour change.

Another critical issue for future research concerns ways of motivating young people to stop smoking and to use the support of web-based tools. More knowledge is needed on how to create an awareness of the problem behaviour among young people. In addition to this health-policy issue, scientific research should deal with the improvement of the recruitment methods. As the previous experience with this hard-to-motivate target group has shown, focus has to be placed not only on traditional advertising techniques, but also on a more proactive method of recruitment.

Concluding comments

Although web-based tobacco interventions for adolescents are still at an early stage of development, the current experience gives cause for optimism. As this documentation shows this innovative approach of addressing young smokers has been implemented in several countries worldwide, with gaining popularity and backed up by an increasing range of scientific evidence.

However, noticeable challenges are associated with their development and dissemination. An important issue to be tackled is the improvement of recruiting methods, i.e. creating an awareness of the problem, motivating young smokers to quit and to make use of cessation tools. As the discussion made clear, a wide range of methods including several proactive approaches can be regarded as useful. Moreover, technological progress allows for various ways of enhancing programme efficacy. Nevertheless there is consensus that the further development of web-based cessation aids should not rely on technological improvements alone. Thus, efforts have to be made to develop a solid theoretical background, suited for the target group and the medium in use.

Undoubtedly, there is considerable need for innovative means to reduce tobacco consumption among adolescents and young adults. As this workshop has shown, web-based interventions are one promising way of meeting this challenge.

The Federal Centre for Health Education (BZgA) is an authority in the sphere of responsibility of the Federal Ministry of Health and is based in Cologne. In the field of health promotion, it handles both information and ‚communication tasks (education function), as well as quality assurance tasks (clearing and coordination function).

The information and communication tasks include the provision of information and education in subject areas with particular priority as regards health. In cooperation with partners, the BZgA implements campaigns in various fields, such as AIDS prevention, drug prevention, sex education and family planning. The target group-specific work of the BZgA currently focuses on promoting the health of children and young people. The key tasks of the BZgA in quality assurance include the formulation of basic scientific principles, the development of guidelines, and the elaboration of market overviews of media and measures in selected fields.

As part of its quality assurance tasks, the BZgA organises conferences and commissions research projects, expert reports and studies on current topics of health education and health promotion. For the most part, the results of this work are incorporated into the series of scientific publications from the BZgA, in order to make them accessible to the interested public in the various fields of health promotion. The "Research and Practice of Health Promotion" booklet series is intended to be a forum for scientific debate. The primary aim is to expand and promote the dialogue between science and practice and to establish a basis for successful health promotion

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