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## **PREDICTORS FOR SUCCESSFUL QUITTING AMONG MORE THAN 4000 SMOKERS USING SMS OR INTERNET-BASED PROGRAMS**

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## **Abstract**

**Background:** The prevalence of daily smoking in Norway has decreased over the years among both men and women like in other developed countries. However, smoking remains one of the world's leading causes of preventable deaths. Studies have shown that quitting smoking is very beneficial. A web-based smoking cessation service is one of the aids for quitting smoking. The Directorate of Health opened the website, [www.slutta.no](http://www.slutta.no) to the Norwegian public as part of the national smoking cessation strategy. Quit smoking campaigns in 2011 through 2012 included promotion of the website through advertisements in newspapers, internet, radio and television. The purpose of the present study was to determine if selected characteristics could predict successful smoking cessation among smokers using a web-based cessation program for quitting smoking in Norway.

**Methods:** We followed 4,335 Norwegian men and women who signed up to a multi-component Norwegian internet-based smoking cessation program, [www.slutta.no](http://www.slutta.no). The enrollment was from May 2010 until October 2012. The inclusion criteria were smokers above 16 years of age who were willing to quit, had regular access to the internet, owned a mobile phone, could write Norwegian and give an informed consent. The outcome was a self-reported, no smoking past 7 days at 1 month, 3, 6 and 12 months. We performed Independent samples t-test, Cross-tabulations and Pearson's Chi-squared test to determine the difference between quitters and smokers at 1 month, 3, 6 and 12 months for selected baseline characteristics. We used Logistic regression model to test for predictors of successful quitting at 1 month, 3, 6 and 12 months compared with those who continued to smoke, while adjusting for relevant confounders and placing emphasis on the predictors at 6 months.

**Results and discussion:** At 6 months, those who reported to have more than 9 years of education were twice as likely to successfully quit smoking [10-12 (OR=2.19; 95% CI=1.15-4.17), 13-16 (OR=2.65; 95% CI=1.40-5.01) and  $\geq 17$  (OR=2.65; 95% CI=1.37-5.11)] compared with those who reported to have 9 years or less education. Those who reported having a very strong motivation at enrollment had twice (OR=2.04; 95% CI=1.36-3.06) the success of quitting smoking compared with those who reported having a weak motivation. Those who reported to use snus daily or occasionally were less likely to achieve successful quitting. Compared with non-snus users, this was significantly decreased with 51% for both occasional snus users (OR=0.49; 95% CI=0.33-0.74) and daily snus users (OR=0.49; 95% CI=0.27-0.90). Other significant predictors of decreased successful cessation included having many friends who were smokers, experiencing social pressure to quit, hating most to give up the first cigarette in the morning, and being unemployed or schooling. In addition, our results found that those who reported they had tried to quit before had a 39% decreased (OR=0.61; 95% CI=0.43-0.89) success of quitting smoking compared with those who had not. We found as expected that those with longer education and higher motivation were more likely to quit than those who had not. We did not expect that snus users were less likely to quit smoking, as snus use can be a cessation aid. We also found it interesting that the web-based cessation program option seemed to intrigue smokers who had not tried to quit before.

**Conclusions:** Health workers and officials can use the knowledge about the predictors of successful smoking cessation for those using a web-based cessation service to encourage smokers in these categories and in campaigns for smoking cessation. The results may be used to revise and improve the web-based cessation service so smokers with lower education, who are unemployed and who use snus daily or occasionally can succeed in their cessation attempt.

**Key words:** predictors; smoking cessation; smokers; quitters; internet; slutta.no

## Abbreviations

BMI	-	Body Mass Index
CI	-	Confidence Interval
E-mail	-	Electronic mail
FCTC	-	Framework Convention on Tobacco Control
FTND	-	Fagerstrom Test for Nicotine Dependence
IBM	-	International Business Machines
kg/m <sup>2</sup>	-	kilograms per meters squared
LR	-	Likelihood Ratio
MPOWER	-	Monitor tobacco use and prevention policies Protect people from tobacco smoke Offer help to quit tobacco use Warn about the dangers of tobacco Enforce bans on tobacco advertising, promotion and sponsorship Raise taxes on tobacco
N (n)	-	Number
OR	-	Odds Ratio
PAHs	-	Polycyclic Aromatic Hydrocarbons
p value	-	Probability value
RCT(s)	-	Randomized Controlled Trial(s)
Ref.	-	Reference category
SD	-	Standard Deviation
SES	-	Socio-economic Status
SMS	-	Short text Messaging Service
SPSS	-	Statistical Package for the Social Sciences
TTF	-	Time to the first cigarette in the morning
UDI	-	Utlendingsdirektoratet (Norwegian Directorate of Immigration)
UiT	-	Universitet i Tromsø (University of Tromsø)
U.S	-	United States of America
WHO	-	World Health Organization





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# 1 Introduction

Tobacco is a legal drug that kills many of its users when used in the exact manner intended by the manufactures. Furthermore, smoking is one of the world's leading causes of preventable deaths (1,2). Nicotine, found in tobacco and its derived products is a toxic chemical and a psychoactive substance with both positive and negative effects. Stimulated memory and alertness, perceived sense of well-being, improved mood and possibly relieved minor depression are some of the positive effects claimed to be associated with nicotine use (3). On the other hand, nicotine is addictive and high-enough doses have acute deadly toxicity. Nicotine is the product that induces addiction in smokers that makes them continue to smoke. Nicotine also causes detrimental effect on an individual's health. Additionally, tobacco smoke contains at least 70 carcinogens, more than 7,000 chemicals and chemical compounds like metals and polycyclic aromatic hydrocarbons (PAHs) devastating to health (4). A study by Anthony *et al.* (5) in 1994 found that the dependence on tobacco is stronger than that of alcohol and other drugs such as marijuana or cocaine among the noninstitutionalized American civilian population aged 15-54 years.

## 1.1 Prevalence of smoking and tobacco use

According to the World Health Organization (WHO), there is a downward trend in tobacco use and the number of non-smokers has increased. Ironically, though the consumption of tobacco products is declining in some developed countries, it is increasing globally (6,7). Every year, an estimated six million individuals die premature as a result of tobacco use. About 10 percent of these are non-smokers and therefore die due to second-hand smoke exposure (8). Smokers on average have a reduced life expectancy of about 10 years as compared to non-smokers (9). The decline in the number of people who smoke in Norway is

reflective of the trend in smoking in the developed countries. In Norway, the prevalence of daily tobacco smoking was 63 percent in men and 25 percent in women among those aged 15 years and above in 1960. Among the Norwegian population aged 16-74 years, 51 percent of men and 32 percent of women were daily smokers in 1973. The prevalence of daily smoking declined for men and increased for women until there was an equal smoking prevalence of 40 percent for both sexes in the 1990s. From then onwards, there was a steady decrease in the smoking prevalence for both sexes and in 2010, this was less than 20 percent. In 2011, the prevalence of smoking among this age group was about 17 percent for both men and women. Nevertheless, the occasional smoking prevalence remained stable for about 30 years at around 10 percent (10,11). In 2012, 16 percent of adults aged 16-74 years smoked daily, men and women in the same age group who smoked occasionally were 11 percent and 9 percent respectively. In Norway, many current smokers started and developed the habit as teenagers (12). The use of snus is on the increase in Norway especially among adolescents and young adults. From the mid-1980s through the 1990s, less than 10 percent of men and very few women used snus. The twenty first century saw an increase in snus use with 10-13 percent of men using snus regularly, 5-7 percent using it occasionally and 2-3 percent of women using snus regularly. In 2012, among adults aged 16-74 years, 14 percent of men used snus daily and 6 percent used it occasionally whereas 4 percent of women were daily users and 2 percent occasional users (10-12).

## **1.2 WHO tobacco control strategy**

To date, a tobacco free world continues to be one of Public health's greatest challenges in spite of a worldwide tobacco control strategy spearheaded by the WHO (13). The WHO Framework Convention on Tobacco Control (WHO FCTC) measures identified six effective

tobacco control policies that have proven to reduce smoking prevalence. These tobacco control policies are included in a policy package known as MPOWER to aid in the fight against the tobacco epidemic. Implementation of the policy package requires countries to monitor tobacco use, protect people from tobacco smoke, offer help to quit tobacco use, warn about the dangers of tobacco, enforce bans on tobacco advertising and promotion, and raise taxes on tobacco products (14,15).

### **1.3 Norway tobacco control strategy**

In Norway, aside measures aimed at reducing tobacco use such as high taxes, mass media campaigns, health warnings on tobacco products and a ban on smoking in public places, there are tobacco cessation services available to tobacco users. The quit line, the web-based smoking cessation intervention program known as slutta.no, individual or group local services, which may include the use of pharmaceuticals offered through the health services, working life and voluntary organizations, are all measures to help individuals who smoke to quit successfully. Despite cessation services being a high priority in the national tobacco control strategy for 2006-2010, an evaluation by WHO in 2010 on the tobacco control work in the country reported it as almost non-existent. The WHO team also concluded that the almost non-existent cessation services was one of the biggest challenges to continued progress in the tobacco control work in Norway. The WHO report recommended that the cessation potential of the quit line and cessation website be maximized by developing a strong comprehensive infrastructure for delivery and referrals to these and other evidence-based cessation services. The goals for the 2013-2016 national tobacco control strategy by the government included an improved strategy for smoking cessation services. The quit line, the cessation website and brief intervention (health professionals inquiring about tobacco use)

were to be promoted by health workers and managers in the municipal or county health services (11). Tobacco control strategies and health professionals are both very crucial in an individual's decision and progress to smoking cessation (16).

### **1.3.1 Slutta.no**

Slutta.no is a multi-component Norwegian smoking cessation website that helps current smokers and tobacco users to quit. The website offers self-help tips on how to quit smoking and tobacco use. There is available information on the dangers of smoking, smoking cessation including how to avoid weight gain, how to make cravings for tobacco use more manageable and the use of medication for successful smoking cessation. In addition, there are interactive tools aimed at encouraging smokers to quit successfully. (17). Shahab and McEwen (18) identified 11 relevant randomized control trials (RCTs) in a systematic review to determine the efficacy and acceptability of online interventions for smoking cessation. In the study, they concluded that as a cessation aid, interactive web-based interventions for smoking cessation could be effective.

## **1.4 *Harmful effects of smoking***

Smoking is associated with cancers and diseases in almost every organ in the human body, diminished health status and harm to the fetus. Recently, diabetes mellitus, rheumatoid arthritis and colorectal cancer are among the list of smoking-related diseases, according to the 2014 report of the Surgeon General (4). Furthermore, tobacco use causes inflammation and impaired immune function. Studies have shown that second-hand smoke exposure is associated with cancer, respiratory diseases, cardiovascular diseases and adverse effects on infant and child health (4). Other problems associated with smoking and tobacco use include; lost wages for families of tobacco users who die prematurely, excessive amounts of family



income spent on the purchase of tobacco products, increase in cost of health care as a result of the treatment of preventable illnesses, and reduced productivity which hinder economic development. Children who are employed to work on tobacco farms in certain developing countries are vulnerable to “green tobacco sickness”, a condition caused by the absorption of nicotine from wet tobacco leaves through the skin when handled (8).

### **1.5 Benefits of smoking cessation**

Smokers of both sexes and all ages who quit become healthier and live longer as compared to those who continue to smoke. Several factors at the time of quitting such as the number of years of smoking, the number of cigarettes smoked per day, the presence or absence of disease may determine the quality of life and the life expectancy after smoking cessation. However, there is improved health and increased life expectancy because there is a reduction in the risk of dying from specific smoking-related diseases such as lung cancer and coronary heart disease. Once an individual stops smoking, the harmful effects of smoking begin to decline. With sustained abstinence from smoking, the harmful effects may be reversed permanently returning to that of those who have never smoked, in certain instances (19).

### **1.6 Previous studies on predictors of smoking cessation**

Research on smoking is very extensive and comprehensive. Both studies with and without an intervention have examined the predictors of smoking cessation. In a cohort tracking telephone survey of 13, 415 American and Canadian cigarette smokers aged 25-64 years who were interviewed in 1988 and re-interviewed in 1993, Hymowitz *et al.* (20) found that the predictors of successful smoking cessation were male gender, older age, higher income, lower

levels of daily cigarette consumption and longer time to first cigarette in the morning. Furthermore, the initiation of smoking after age 20, the desire to stop smoking, and the absence of other smokers in the household reported at the start of the survey in 1988 predicted smoking cessation success (20). Similarly, a quasi-experimental study conducted in the United States of America (U.S) among 8,726 participants by Boal *et al.* (21) identified male gender and not smoking within 30 minutes of waking as predictors of 7-day smoking abstinence at 6 months.

The authors of a Southeast Asian cohort survey that examined the predictors of smoking cessation among 4,004 smokers in Malaysia and Thailand conducted a face-to-face interview with the respondents in 2005 and then a follow-up in 2006. In this study, the predictors of smoking cessation and maintenance included smoking fewer cigarettes per day, higher levels of self-efficacy, more immediate quit intentions, older age, and prior abstinence for 6 months or more (22). Likewise, self-efficacy was a predictor of successful quitting among 214 respondents to a primary randomized controlled trial (RCT) of a web-based smoking cessation study (23). A systematic review to determine the common predictors of smoking cessation that could help in routine clinical consultations by Caponnetto and Polosa (24) found 202 relevant articles on the topic. Age at smoking initiation was a predictor of smoking cessation; men who started smoking before the age of 16 years had about twice the odds for not quitting smoking as those who started at a later age. In addition, smoking cessation was positively related to previous quit attempts and not having any smokers in the household (24).

In a national representative random sample of 1,056 Danish adults aged 25-64 years who smoked in 1994, the predictors of quitting smoking were identified as increased number of years of education and low amount of tobacco consumption when they were re-interviewed in 2000. The odds of quitting smoking increased with the number of years of education (25). A study by Lund *et al.* (26) among 5,125 Norwegian adults aged 25-74 years found that high

social status and living with a spouse or partner increased smoking quit rates. In Finnmark, a cohort study on the factors with the greatest impact on smoking cessation included 12,658 participants from a 1977-1978 health survey who were followed for ten years. The study identified the primary factors for smoking cessation as having a short history of smoking, older age at enrollment, having non-smoking family and friends, and having been diagnosed with a smoking-related disease or illness (27). On the opposite side, the predictors of unsuccessful quitting include; being a late-onset smoker (individuals who start smoking late in life), stress, depression, smoking within 30 minutes of waking, and high levels of nicotine addiction (24,26,28).

## **1.7 Purpose and Objective**

Increased knowledge about the predictors that increase the likelihood of successful smoking cessation is useful regardless of the methods used. There is a lack of knowledge concerning web-based cessation programs, and which smokers these programs are useful for and attract. Health professionals can better help willing individuals to quit smoking successfully if they are provided with such knowledge. There is therefore the need for more studies on predictors and factors that contribute to the successful quitting among smokers. The purpose of the present study was to examine selected characteristics to see if they could predict successful smoking cessation among smokers using an internet website for quitting smoking in Norway.

- ***Aims of Master Thesis***

The main aim of the study was to identify predictors for successful quitting at 1 month, 3, 6 and 12 months after recruitment with emphasis on the predictors at 6 months.



## **2 Materials and Methods**

### **2.1 Study Design**

This study utilized data from a randomized controlled trial (RCT) conducted in Norway from May 2010 to October 2012. In summary, registered new users of the internet-based cessation program, slutta.no were automatically allocated to either an intervention or control group after they gave their consent to participate in the study. They were informed of the testing of two different versions of the website and assured of exposure to similar messages. The participants were sent tailored messages by either short text messaging services (SMS) or electronic mail (e-mail) for twelve months; the intervention and control group respectively. The present study uses a follow-up design for all participants enrolled in the RCT study.

### **2.2 Recruitment**

Slutta.no, the online smoking cessation service was created by the Norwegian Center for Integrated Care and Telemedicine in collaboration with the Norwegian Directorate of Health, for the Norwegian population. The Directorate of Health promoted the website during the period of the study through newspaper, radio, television and internet advertisements. Aside these, no special recruitment procedures were employed. New users on the website were simply asked if they were interested in participating in the trial. The individual aspects of the study such as registration, randomization, intervention delivery, and submission of the follow-up questionnaires were all automated and performed via internet, and SMS for the intervention group where applicable.

### **2.3 Study Subjects**

Altogether, 9,523 new users registered on slutta.no (included all tobacco users) during the trial period and 76.8% (n=7,315) of these registered on the smoking cessation program. The eligible participants (n=5,804) fulfilled the required inclusion criteria of being 16 years or older, being a current smoker willing to quit within the next twelve weeks and owning a mobile phone with a Norwegian number. Having the ability to write, read and understand Norwegian, having regular access to the internet, having a personal e-mail address, being willing to fill the baseline questionnaire and having the ability to give an informed consent were also part of the inclusion criteria. The exclusion criteria were; not completing the baseline questionnaire (n=517), reporting to have already quit smoking at baseline (n=631), reporting not smoking cigarettes (n=20), missing or double allocation (n=24) and withdrawal of consent (n=29). There were 248 participants referred to a sub-study. In all, 4,335 (59.3%) of those registered on the cessation program, of which males made up about 28.0% (n=1,212) were included in the study after they had satisfied both the inclusion and exclusion criteria.

### **2.4 Data collection and Baseline characteristics**

At enrollment, the baseline data were recorded as a part of the registration questionnaire for the tailoring algorithm. In summary, the smoking cessation advice was calculated with the tailoring algorithm and sent to the participants relative to their desired quit date. E-mails containing a hyperlink to follow-up questionnaires were sent to each participant. Those who did not respond to the questionnaires were sent reminder e-mails 7 days later. The participants received about 150 tailored messages during the duration of the study. Drupal 6 was used in building the system for the trial; it is formatted for modern smart phones and tablet use as well as “ordinary” phones with internet functions.

The selected baseline characteristics for this study included; Gender (female or male), Age (years), Age start smoking (years), Education ( $\leq 9$  years, 10-12 years, 13-16 years,  $\geq 17$  years), Occupational status (full time worker, part-time or home working, welfare recipients, and not working, which represented those who reported that they were schooling or unemployed). The welfare recipients included pensioners, those who reported that they were on disability benefits or under rehabilitation.

Motivation (weak, quite strong, very strong), Body Mass Index (BMI) measured in  $\text{kg/m}^2$ , which is a derivative of the baseline characteristics; height (in meters) and weight (in kilograms), Friends smoking (few, many, all); the few friends category also included those who reported having no friends who smoke, Quit obstacles (miss coziness/smoke, cessation side-effects, social issues/failure, none of these), Self-efficacy (very high, high, low) and Snus use (daily, occasional, no) were also recorded at enrollment.

We also obtained information on Quitting reasons (worried about health, too expensive, be a role model, dislike being addicted, pregnant, dislike the smell, feel proud and confident, don't see self as smoker, be smoke free because of kids, better fitness, healthier hair, skin and teeth, none of these), Diagnoses (heart disease, respiratory disease, other disease and none of these), Cohabitants (yes or no), Cohabitants smoking (yes or no), Anti-depressant (yes or no), Quit attempted (yes or no), Quit support (yes or no), Social pressure (yes or no), Quit attempts (number of previous attempts made), Number of cigarettes smoked per day and Logins (number of logins per user).

We included questions related to the Fagerstrom Test for Nicotine Dependence (FTND); Fagerstrom smoking time from waking (within 5 minutes, from 6-30 minutes, from 31-60 minutes, after 60 minutes/later), Fagerstrom early morning smoking (yes or no), Fagerstrom smoking in prohibited places (yes or no), Fagerstrom smoke when ill or bedridden (yes or no), Fagerstrom which cigarette (first in the morning or any other) and Fagerstrom number of

cigarettes per day ( $\leq 10$ , 11-20, 21-30,  $\geq 31$ ). Fagerstrom score (0-10 points) and Fagerstrom class, a derivative of the Fagerstrom score (Class 1 =  $\leq 3$  points, Class 2 = 4-6 points, Class 3 =  $\geq 7$  points) were calculated.

## **2.5 Outcome Assessment**

Smoking cessation was a self-reported, no smoking past 7 days at 1 month, 3 months, 6 months and 12 months. Two questions were asked of each of the participants; “Are you currently smoking?” and “Have you been smoking, even as little as one single puff, the past 7 days?” Only participants who answered “No” to both of these questions were considered abstinent at a specified follow-up time. The quitters and non-quitters or smokers at each time point included those who reported to have quit and those who reported to be smoking respectively. Hence, quitters represented anyone who had not smoked for the last seven days or more at a specific time unless otherwise stated.

## **2.6 Missing data**

Less than 5% missing data was recorded for all the variables being measured; hence, it was assumed that the data was missing completely at random. Missing data were assigned the number 99999. There was a technical error which caused the system not to record the variable; Age, correctly in the early stages of the trial though it did not affect the age requirement of 16 years or older. Once discovered, Age was re-introduced and made mandatory in the baseline questionnaire. Recruitment and data collection were continuous, causing a variation in the number of participants being followed up at any of the specified time point.



## **2.7 Statistical Analysis**

A critical look at the data revealed that the information provided by one participant was inconsistent; he reported that he was a male whose reason for quitting was that he was pregnant. We excluded this participant from all the statistical analyses.

We performed descriptive analyses on all the variables. The mean, standard deviation ( $\pm$  SD), median and range of the continuous baseline variables were assessed for all 4,334 participants. For the analytical analyses performed, we used multiple response sets cross-tabulation and frequencies to analyse the “Quitting Reasons” and the “Diagnoses” variables because the participants were allowed to choose multiple answers from a multiple choice question. We used the Pearson’s chi-squared test with Bonferroni corrections to test for differences between cessation status (quitters and smokers) at each follow-up time with respect to the quitting reasons and the diagnoses.

We tested for the mean ( $\pm$  SD) difference between cessation status at 1 month, 3, 6 and 12 months for the continuous baseline variables such as age start smoking, BMI and number of cigarettes using the Independent samples T-test. We also calculated the percentage distribution of the categorical variables such as gender, cohabitants, motivation and each of the Fagerstrom variables that make up the score. In addition to this, we compared the percentage distributions of these selected baseline characteristics for cessation status at 1 month, 3, 6 and 12 months each using cross-tabulation with Pearson’s Chi-Square test. This was to determine if quitters and smokers differed on each of the selected baseline characteristics.

We used the Logistic regression model to test for the success of quitting smoking at each follow-up time. The dependent variable was a dichotomous variable, cessation status (1=quit or 0=smoke), where quit represented those who reported having stopped smoking and smoke

represented those who reported that they were still smoking at each follow-up. First, we performed a univariate logistic regression analysis for cessation status on each of the independent variables at each follow-up time (data not shown). After the univariate analysis, we included only variables that had a p-value of less than 0.25 in a multiple logistic regression analysis. The backward elimination likelihood ratio (LR) method was used in the multivariate analysis to determine the independent predictors of smoking cessation. We later included the variables from the final model in the previous step in a multiple logistic regression analysis (enter method) together with age for a sensitivity analysis because the age variable was incomplete and could not be included in the main analysis.

In order to determine what happened to the 799 participants who reported that they had quit at one month follow-up, we filtered the data to select only the quitters (those who reported that they had quit at each follow-up) at 1 month and then performed a frequency analysis on the cessation status at 3, 6 and 12 months each. This provided us with the distribution of the quitters and non-quitters or smokers (those who reported to be smoking at each follow-up) among the 799 quitters for 3, 6 and 12 months follow-up each.

Due to emphasis being placed on the predictors of smoking cessation at 6 months, we wanted to analyse the predictors of smoking cessation for those who had quit for a period of 6 months; this included those who reported to be quitters at 1 month who still reported to be quitters at 6 months. Therefore, a multivariate logistic regression analysis with the baseline characteristics that had a p value of less than 0.25 in the univariate analysis for 6 months (data not shown), were used in a backward elimination likelihood ratio (LR) method. The odds ratio (OR) with a 95% confidence interval (95% CI) was estimated for all the regression analyses. For the purpose of this study, we referred to the odds of quitting smoking as the success of quitting smoking.

Overall, we performed the statistical analyses using Statistical Package for the Social Sciences for Windows, the 23<sup>rd</sup> version (IBM SPSS 23.0) with 2-sided p-values <0.05 set as the level of statistical significance.

## **2.8 Ethical Consideration and consent**

The main RCT study was approved by the Regional Committee for Medical Research Ethics. The participants gave their informed consent when they registered on the slutta.no website. Data collected for the purpose of the study were anonymized.



### **3 Results**

The results for the multivariate analyses for 1 month and 3 months, sensitivity analysis and the Pearson Chi-squared test for some of the categorical variables are shown in Supplementary tables. The results presented in Table 4 are for selected variables; the variables that appeared in the final model for the multivariate cox regression analyses with the exception of Age groups.

#### **3.1 *Baseline characteristics***

The median age of the study participants with available age information was 39 years, with the youngest and oldest participants aged 16 years and 78 years respectively. The median age at which the participants started smoking permanently was 15 years. Some participants started smoking permanently as young as 6 years and as old as 53 years of age. The median number of cigarettes smoked per day by the participants was 15 and they had a median Fagerstrom score of 5 which depicts moderate nicotine dependence. The lowest number of logins per user was 1 and the highest number was 865 with the median number of logins per user being 5 (Table 1).

#### **3.2 *Reasons for quitting and Diagnoses***

Table 2 shows that the reasons for quitting smoking at baseline among study participants at each time point were similar. Worrying about one's health, wanting better fitness, dislike being addicted to cigarettes, wanting healthier hair, skin and teeth, and finding the smoking habit too expensive were the most frequently reported reasons for quitting smoking in this population. The successful quitters at 1 month and 6 months were more likely to be worried

about their health at enrollment ( $p < 0.05$ ). In addition, the successful quitters at 3 months had reported that they wanted to be smoke-free because of their kids at enrollment ( $p < 0.05$ ). On the contrary, the successful quitters at 3 months were less likely to want better fitness at enrollment ( $p = 0.03$ ).

More than half of the successful quitters ( $n = 500$ ) and those who continued to smoke ( $n = 1995$ ) at 1 month reported that they had never received any of the listed diagnoses; heart diseases, respiratory diseases and other diseases at enrollment. 12.5% of the successful quitters and 16.0% of the smokers at 3 months reported to have been diagnosed with respiratory diseases at enrollment ( $p = 0.04$ ). Additionally, 32.8% of the successful quitters and 28.5% of the smokers at 12 months reported to have been diagnosed with respiratory diseases at enrollment ( $p = 0.04$ ).

### ***3.3 Mean difference for selected baseline characteristics between quitters and smokers***

Table 3 shows the mean, standard deviation and  $p$  values for quitters and smokers at 1, 3, 6 and 12 months. The successful quitters at 1 month reported to have started smoking permanently at an older age (16.3 years) than those who reported to be smoking (15.9 years). This was statistically significant ( $p = 0.002$ ). A similar result was observed for the other follow-up times but that for 6 months was not statistically significant ( $p = 0.09$ ). Those who reported to have quit smoking at 1 month and 3 months were older at enrollment (40.8 years and 41.4 years respectively) than those who reported to be smoking (39.1 years and 40.0 years respectively;  $p < 0.05$ ). The successful quitters at 1, 3 and 6 months had a lower Fagerstrom score at enrollment compared with those who continued smoking ( $p < 0.05$ ). At

each time point, the mean number of logins for the successful quitters was about four times higher than for those who continued to smoke ( $p = <0.001$ ).

### ***3.4 Distribution of selected baseline characteristics for quitters and smokers***

Table 4 shows that the female quit rate was higher than that of the males at 1, 3 and 6 months but the quit rate at 12 months was approximately equal, 13.0% for males and 12.9% for females. For the participants with age information available, those who were aged 30-45 years were more likely to quit smoking at each follow-up time. Those who were 29 years or younger were less likely to quit smoking at 1 and 3 months but not at 6 and 12 months. Having 17 years or more education, being a full time worker, having few friends who smoke, not using snus, not having someone trying to persuade them to stop smoking (social pressure), very high self-efficacy, hating most to give up any other cigarette and a very strong motivation were predictive of reported successful quitting at each time point. On the opposite side, having ever tried to stop smoking in the past, living with someone who smoked (cohabitants smoking), using snus occasionally, smoking within five minutes of waking, and having no one to support them when they stopped smoking (quit support) were associated with participants reporting to be smokers at each time point.

### ***3.5 Predictors of smoking cessation at six and twelve months***

Table 5 shows the results of the multivariate analyses for six months and twelve months with age excluded from the analysis. At 6 months, those who reported to have more than 9 years of education were twice as likely to successfully quit smoking [10-12 (OR=2.19; 95% CI=1.15-

4.17), 13-16 (OR=2.65; 95% CI=1.40-5.01) and  $\geq 17$  (OR=2.65; 95% CI=1.37-5.11)] compared with those who reported to have 9 years or less education. Those who reported having a very strong motivation at enrollment had twice (OR=2.04; 95% CI=1.36-3.06) the success of quitting smoking compared with those who reported having a weak motivation. Compared with participants who reported having few friends who smoke at baseline, having many friends who smoke resulted in a 21% decreased (OR=0.79; 95% CI=0.63-0.99) success of quitting smoking.

In addition, there was about a 20% decreased success of quitting smoking for those who reported that they lived with someone who smoked (OR=0.81; 95% CI=0.64-1.03) compared with those who did not or lived alone, those who reported having someone try to persuade them to stop smoking (OR=0.77; 95% CI=0.62-0.96) compared with those who did not, and also those who reported they would hate most to give up the first cigarette in the morning (OR=0.80; 95% CI=0.64-0.99) compared with those who would hate most to give up any other cigarette. Furthermore, with respect to occupational status, those who reported they were not working had a 41% decreased (OR=0.59; 95% CI=0.42-0.85) success of quitting smoking compared with those who reported to be full time workers. The likelihood of successfully quitting smoking was almost halved for those who reported at enrollment that they were occasional snus users (OR=0.49; 95% CI=0.33-0.74) or daily snus users (OR=0.49; 95% CI=0.27-0.90) compared with those who reported they did not use snus.

At 12 months, those who reported more than 12 years of education were twice as likely to successfully quit smoking [13-16 (OR=2.25; 95% CI=1.05-4.83) and  $\geq 17$  (OR=2.60; 1.19-5.66)] compared with those who reported 9 years or less education. In addition, those who reported they had tried to quit before had a 39% decreased (OR=0.61; 95% CI=0.43-0.89) success of quitting smoking compared with those who had not. In the sensitivity analyses, where we included those who had information on age in the multivariate analysis, the results



did not differ materially. However, most of the results were lower odds ratio estimates and no longer statistically significant at the 5% level due to low numbers (data shown in Supplementary Table 2).

### **3.6 Successful quitters at one month follow-up**

Figure 1 shows the distribution of the successful quitters at 1 month follow-up. Altogether, 19.1% (n=799) of the 4,194 participants who were assessed at one month follow-up reported to have quit smoking. At 3 months follow-up, 744 (93.1%) of the 799 quitters at 1 month were included in the smoking cessation assessment, out of which 55.6% (n=414) reported they had remained quitters while the remaining 330 participants reported to be smokers. Fifty-five of the quitters were not included in this assessment because they were lost to follow-up. At the 6 months follow-up, 685 (85.7%) of the 799 quitters at 1 month were included in the assessment of cessation status and the remaining 114 were lost to follow-up. Of the 685 quitters, 42.8% (n=293) reported they had remained quitters and 57.2% (n=392) reported to have started smoking again. Altogether, 413 (51.7%) of the 799 quitters at 1 month were included in the cessation status assessment at 12 months follow-up. This is comparable to 22.3% (n=178) successful quitters, 29.4% (n=235) confirmed smokers and 48.3% (n=386) lost to follow-up of the 799 quitters at 1 month.

### **3.7 Predictors of smoking cessation for six months**

Table 6 shows the OR estimates and 95% CI for the variables that were associated with quitting for a period of 6 months (the successful quitters at 1 month who reported they were still quitters at 6 months). Cohabitants smoking and snus use were the only variables

significantly associated with smoking cessation for 6 months in this study. Those who reported they lived with someone who smoked had a 36% decreased (OR=0.64; 95% CI=0.45-0.91) success of quitting smoking compared with those who did not or lived alone. In addition, those who reported to be occasional snus users had a 64% decreased (OR=0.36; 95% CI=0.20-0.63) and daily snus users had a 79% decreased (OR=0.21; 95% CI=0.09-0.51) success of quitting smoking compared with those who reported they did not use snus.

## 4 Discussion

### 4.1 Main findings

The predictors of successful smoking cessation in this study were higher education and a very strong motivation. Those who reported they had 10 years or more education were twice as likely to quit smoking successfully compared with those who reported they had 9 years or less. Reporting a very strong motivation at the start of the study increased the success of quitting smoking. Not working and snus use were predictive of unsuccessful smoking cessation. There was a decreased success for those who reported not working compared with those who did. Likewise, both those who reported to be occasional and daily snus users had a decreased success of quitting smoking compared with non-snus users. In addition to this, those who reported they had someone trying to persuade them to quit smoking, they had many friends who smoked, and those who reported they would hate most to give up the first cigarette in the morning had a decreased success of quitting smoking. Furthermore, there was a decreased success of quitting smoking for those who reported to have tried to quit before, compared with those who had not.

In some previous studies examining smoking cessation with or without an intervention, higher education was consistent with predicting successful smoking cessation (25,29,30). Education as a measure of socio-economic status (SES) has also been associated with successful smoking cessation in a Norwegian study by Lund *et al.* (26). Similarly, our findings show that higher education is a predictor of successful smoking cessation. Zimmerman *et al.* (25) suggest that the extent to which smokers are knowledgeable about the harmful effects of smoking is reflected in their level of education. In our study, the participants who reported to have 9 years or less education were fewer (7.1%) than in the other educational groups. This may suggest that aside from the possible limited knowledge of the harmful effects of

smoking, those with lower education also had limited knowledge of the web-based smoking cessation service, slutta.no.

Although different measures of motivation have been used in different studies, the basic concept of motivation seems to be common to all the studies. That is, the factors be it internal or external which stimulate desires and energy in people to be continually interested and committed to make an effort to attain a goal (31). In agreement with past research (32-34), this study finds that very strong motivation at enrollment is a predictor of successful smoking cessation. The anticipation of either internal rewards such as better health, pride and self-confidence or external rewards such as financial gain, being a role model and social approval may have been the motivational factors for the successful smoking cessation among the participants in our study (24).

A very strong association between occupational status and smoking cessation was observed in our study. Smokers who reported not working, specifically those who reported they were schooling or seeking employment had a decreased success of quitting smoking compared with those who reported to be full time workers. Over the years, the association between unemployment and smoking has been established. Besides that, almost all the findings from previous studies point to unemployment and low income decreasing the odds of quitting smoking and vice versa (35-38).

Previous studies on the association of snus use and smoking cessation are extensive and diverse. Epidemiological studies and RCTs from different countries including Norway analysed in a systematic review by Lee (39) suggest that the dual use of snus and cigarettes increases the probability of quitting smoking. The findings in our study are in conflict with this result but they are consistent with the results from four other studies on snus use and smoking cessation (40-43). In these studies, they concluded that the use of snus was not associated with either successful quit attempts or smoking cessation. Both occasional and

daily snus use decrease the success of quitting smoking in our study. In a study by Lund and McNeil (44) among Norwegian men, the majority of daily snus users reported that their snus use was a smoking cessation aid whereas the occasional snus users reported their snus use as a smoking reduction and substitution mechanism. A possible explanation for the results in our study could be that the use of snus, another nicotine product may have increased the nicotine dependence of the participants making it more difficult to quit (45). The use of snus as a cessation aid may result in smokers quitting if they use it with accompanying instructions, support and monitoring (46).

Friends smoking was associated with decreased success of smoking cessation. Those who reported having many friends who smoked had a decreased success of quitting smoking compared with those who reported having few friends who smoked. In addition, for six months reported smoking cessation, those who reported living with someone who smoked had a decreased success of quitting smoking compared with those who reported not living with someone who smoked or lived alone. Similar to these findings is the result of a study among workers in the United States of America (U.S), which found that those who had frequent exposures to others smoking at work or living in a home that permitted smoking were less likely to stop smoking (47). In addition, in the study by Abildsnes *et al.* (27), quitting smoking was associated with having non-smoking friends and family. Caponnetto and Polosa's reasoning in their paper can be applied here. It might seem like acceptable behaviour and the smokers may be less inclined to quit if those they live or associate with, those whose opinion they value, smoke cigarettes (24).

With regards to social pressure, there are conflicting studies on its association with smoking cessation. One study found that having pressure from family and friends to quit was associated with the decreased likelihood of quitting (48), whereas another found that social pressure was associated with successful quitting (30). Our study's findings tend to agree with

the former; social pressure decreased the success of quitting smoking. This might suggest that deciding to quit smoking by oneself is very important in the smoking cessation process because it may require self-will, self-control and a strong resilience.

In our study, the participants who reported that they would hate most to give up the first cigarette in the morning had a decreased success of quitting smoking. Fagerstrom which cigarette (as used in our study) is one of the variables that make up the Fagerstrom score and rarely used alone. We could associate it with the time to first smoke from waking, also referred to as the time to the first cigarette of the day (TTF), which is considered one of two important measures of nicotine dependence and has been associated with smoking cessation (49,50). Studies have shown that longer time to smoking the first cigarette in the morning, more than 30 minutes of waking predicts successful smoking cessation (20,21,50). Hating most to give up the first cigarette in the morning could suggest that the participants preferred to smoke in the morning and possibly not long after waking.

The results from previous studies all suggest that having tried to quit in the past increased the odds of quitting smoking (24,51-53). Interestingly, the findings in our study show that those who reported having tried to quit in the past had a decreased success of quitting smoking compared with those who had never tried to quit. A possible explanation could be that those who had not tried to quit in the past found the web-based smoking cessation service intriguing and more suited to them with regards to quitting smoking than those who had tried to quit in the past. Another possible explanation might be that for the smokers in this sample, failure to quit successfully in a previous attempt(s) discouraged them from putting in the extra effort needed to succeed even though they signed up to slutta.no. In addition, we do not know the duration of previous quit attempts, usually smoking cessation success rates increase with number of tries and quit attempts that last longer than 5 days (24,54).

## **4.2 Strengths and Limitations**

The study targeted smoking adults in the Norwegian population; this population-based methodology grants strength to this study. In addition, there was a wide variety of baseline data on smoking characteristics gathered for the purposes of the study (44). Another strength of this study is the prospective design employed, following current smokers for 12 months to find out those who report quitting and those who do not at specified time points.

There are a couple of limitations to this study. First of all, due to a technical error at the beginning of the study, data on the age of the participating smokers was incomplete. Hence, analysis with this variable was limited. Age appears to be a very important variable in the study on smoking cessation because most of the previous studies show an association between age and smoking cessation. The results from some previous studies suggest that an increase in age increases the likelihood of quitting smoking but this is usually among those who are 45 years or older (20,27,38,55).

Secondly, the outcome measure, smoking cessation was self-reported with no biochemical validation. In addition, all baseline characteristics were self-reported except for the number of logins, which technically is not a baseline characteristic. Bias because of social desirability or strategic responses, under- or over-reporting and misclassification due to imperfect recall cannot be ruled out (44,56). Self-reports of smoking and hence smoking cessation have been shown to be accurate in most studies. That being said, in intervention studies, there is the need to improve the accuracy by performing biochemical assessment (57). The above-mentioned limitations do not affect the reliability of the results in this study.

### **4.3 Generalizing findings**

The study was conducted in an adult population of Norway, which is a high-income country with quite an effective national tobacco control strategy (11). The findings of this study should be viewed in relation to adults aged 16 years and above, high-income countries or countries with a working national control strategy that includes a web-based smoking cessation website.

### **4.4 Recommendations for further studies**

Some of those who reported quitting smoking did so for different lengths of time before resuming smoking (relapse) or continuing to abstain (data not shown). Even though analysis for the predictors of those who were abstinent for the first six months of the study was done, further studies need to be done to find out the predictors of smoking cessation for the different lengths of successful cessation. The reasons for relapse and sustained abstinence also need to be explored further to facilitate the successful use of web-based cessation services for quitting smoking.

In their study, An *et al.* (58) found out that the use of interactive quitting tools and one-to-one messaging with other members of a web-based cessation service was associated with increased abstinence rates. Further studies concerning slutta.no could try to find the relationship between the services offered on the website and successful smoking cessation. These services can then be promoted in the public to ensure a high quit rate among current smokers.



## 5 Conclusions

Among smokers who signed up to use a web-based smoking cessation service, the predictors of successful cessation included higher education (10 years or more) and a very strong motivation. On the other hand, the predictors of unsuccessful cessation were having many friends who smoked, social pressure to quit, hate most to give up first cigarette in the morning, not working, occasional and daily snus use, and having attempted to quit in the past.

Increased knowledge about the predictors of successful smoking cessation for those using a web-based cessation service may be used by health workers to encourage smokers in these categories. Secondly, it may be utilized by health officials in their campaigns for smoking cessation. Thirdly, the results may be used to revise and improve the web-based cessation service so smokers with lower education, who are unemployed and who use snus daily or occasionally can succeed in their cessation attempt.



**Table 1**

Selected baseline characteristics of all the study participants.

<b>Variables</b>	<b>Number (N)</b>	<b>Mean (<math>\pm</math>SD)</b>	<b>Median</b>	<b>Range</b>
<b>Age (years)</b>	1665	39.4 (11.4)	39	16 – 78
<b>Age start smoking(years)</b>	4307	15.9 (3.4)	15	6 – 53
<b>Number of cigarettes per day</b>	4331	15.8 (6.7)	15	0 – 60
<b>Fagerstrom score</b>	4237	4.3 (1.8)	5	0 – 9
<b>Quit attempts<sup>§</sup></b>	3696	4.0 (4.9)	3	0 – 50
<b>BMI (kg/m<sup>2</sup>)</b>	4288	25.5 (5.0)	24.6	14.1 – 68.0
<b>Logins</b>	4328	20.0 (56.8)	5	1 – 865

BMI=Body Mass Index; weight in kilograms divided by the square of the height in meters

SD=Standard Deviation

<sup>§</sup> Quit attempts for only those who have tried to quit in the past

**Table 2**

Distribution (%) and correlation (*p*) of selected variables at baseline for those who reported to be quitters at 1 month, 3, 6 and 12 months compared to those who reported to be smokers.

	Cessation status											
	1 month %			3 months %			6 months %			12 months %		
	Quit N=799 (100%)	Smoke N=3395 (100%)	p	Quit N=561 (100%)	Smoke N=3290 (100%)	p	Quit N=405 (100%)	Smoke N=3205 (100%)	P	Quit N=241 (100%)	Smoke N=1626 (100%)	p
<b>Quitting Reasons</b>												
Worried about health	81.5	77.9	<b>0.03</b>	80.9	77.9	<b>0.11</b>	83.5	77.7	<b>0.01</b>	81.3	76.7	<b>0.11</b>
Too expensive	51.8	59.8	<b>&lt;0.001</b>	49.6	59.8	<b>&lt;0.001</b>	46.2	60.0	<b>&lt;0.001</b>	47.3	58.2	<b>0.001</b>
Be a role model	31.9	33.4	<b>0.41</b>	31.9	33.1	<b>0.57</b>	34.1	32.5	<b>0.53</b>	29.9	32.6	<b>0.40</b>
Dislike being addicted	58.8	56.8	<b>0.29</b>	57.6	57.2	<b>0.86</b>	60.0	57.0	<b>0.25</b>	61.4	58.4	<b>0.37</b>
Pregnant	2.6	3.4	<b>0.26</b>	1.6	3.3	<b>0.03</b>	2.5	3.1	<b>0.47</b>	2.5	3.5	<b>0.42</b>
Dislike the smell	27.2	24.9	<b>0.18</b>	26.6	25.8	<b>0.70</b>	28.1	25.8	<b>0.31</b>	26.6	26.6	<b>0.98</b>
Feel proud and confident	41.2	40.6	<b>0.78</b>	39.9	41.0	<b>0.62</b>	41.5	40.8	<b>0.80</b>	39.0	43.7	<b>0.17</b>
Don't see self as smoker	11.8	10.1	<b>0.17</b>	11.8	10.4	<b>0.34</b>	11.9	10.5	<b>0.42</b>	11.6	12.0	<b>0.87</b>
Be smoke free because of kids	41.2	40.8	<b>0.84</b>	45.1	40.1	<b>0.03</b>	43.2	40.3	<b>0.27</b>	37.8	40.6	<b>0.40</b>
Better fitness	62.7	65.4	<b>0.15</b>	61.0	65.6	<b>0.03</b>	64.0	65.1	<b>0.63</b>	65.6	64.5	<b>0.75</b>
Healthier hair, skin and teeth	56.7	57.2	<b>0.81</b>	54.0	58.1	<b>0.07</b>	57.8	57.8	<b>0.98</b>	54.4	59.4	<b>0.14</b>
None of these	0.8	0.5	<b>0.33</b>	0.9	0.5	<b>0.19</b>	0.5	0.5	<b>0.92</b>	0.0	0.6	<b>0.22</b>
<b>Diagnoses</b>												
Heart diseases	1.3	2.0	<b>0.17</b>	1.1	1.9	<b>0.15</b>	1.2	1.9	<b>0.34</b>	0.4	1.5	<b>0.18</b>
Respiratory diseases	13.6	16.4	<b>0.06</b>	12.5	16.0	<b>0.04</b>	12.1	15.8	<b>0.05</b>	11.2	16.2	<b>0.04</b>
Other diseases*	29.2	30.8	<b>0.38</b>	30.1	30.3	<b>0.93</b>	29.4	30.6	<b>0.62</b>	32.8	28.5	<b>0.17</b>
None of these	62.6	58.8	<b>0.05</b>	62.4	59.6	<b>0.21</b>	64.0	59.3	<b>0.08</b>	61.0	61.1	<b>0.97</b>

%=percent

N=number

\* Includes stomach ulcers, damage to the macula, bone disease, and muscle, joint and back problems

**Table 3**

Selected continuous characteristics (mean ( $\pm$ SD)) at baseline for those who reported to be quitters at 1 month, 3, 6 and 12 months compared with those who reported to be smokers.

Variables	Cessation status											
	1 month Mean ( $\pm$ SD)			3 months Mean ( $\pm$ SD)			6 months Mean ( $\pm$ SD)			12 months Mean ( $\pm$ SD)		
	Quit N=799	Smoke N=3395	p	Quit N=561	Smoke N=3290	p	Quit N=405	Smoke N=3205	p	Quit N=241	Smoke N=1626	p
Age start smoking (years)	16.3 (3.3)	15.9 (3.4)	<b>0.002</b>	16.5 (3.5)	15.9 (3.4)	<b>&lt;0.001</b>	16.2 (3.2)	15.9 (3.4)	<b>0.09</b>	16.6 (3.8)	16.0 (3.2)	<b>0.01</b>
Age (years)	40.8 (10.6)	39.1 (11.6)	<b>0.01</b>	41.4 (10.5)	40.0 (11.5)	<b>0.03</b>	41.0 (10.5)	41.5 (11.3)	<b>0.55</b>	41.4 (11.0)	42.2 (11.6)	<b>0.48</b>
Number of Cigarettes per day	15.4 (6.5)	15.9 (6.8)	<b>0.10</b>	15.5 (6.3)	15.8 (6.8)	<b>0.34</b>	15.2 (6.5)	15.8 (6.7)	<b>0.06</b>	16.0 (6.8)	15.7 (6.7)	<b>0.53</b>
Quit attempts <sup>§</sup>	4.2 (5.4)	3.9 (4.8)	<b>0.28</b>	4.1 (4.5)	4.0 (5.1)	<b>0.63</b>	4.3 (5.4)	4.0 (4.9)	<b>0.29</b>	3.8 (4.4)	4.2 (5.7)	<b>0.17</b>
Logins	55.2 (98.8)	12.2 (38.2)	<b>&lt;0.001</b>	60.3 (102.7)	14.3 (42.9)	<b>&lt;0.001</b>	65.1 (106.1)	15.4 (45.5)	<b>&lt;0.001</b>	70.5 (117.3)	18.7 (53.3)	<b>&lt;0.001</b>
BMI (kg/m <sup>2</sup> )	25.5 (4.6)	25.5 (5.1)	<b>0.96</b>	25.7 (4.9)	25.4 (5.0)	<b>0.34</b>	25.1 (4.8)	25.5 (5.0)	<b>0.20</b>	25.2 (4.5)	25.2 (4.7)	<b>0.94</b>
Fagerstrom score	4.1 (1.9)	4.3 (1.7)	<b>0.02</b>	4.1 (1.9)	4.3 (1.8)	<b>0.02</b>	4.0 (1.9)	4.3 (1.8)	<b>0.002</b>	4.2 (1.8)	4.2 (1.8)	<b>0.84</b>

BMI=Body Mass Index; weight in kilograms divided by the square of the height in meters

SD=Standard Deviation

<sup>§</sup> Quit attempts for only those who have tried to quit in the past

**Table 4**

Selected categorical characteristics (%) of those who reported to be quitters at 1 month, 3, 6 and 12 months compared with those who reported to be smokers.

Variables	Cessation status															
	1 month %				3 months %				6 months %				12 months %			
	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>
<b>Age groups</b>				<b>0.001</b>				<b>0.02</b>				<b>0.38</b>				<b>0.42</b>
≤ 29 years	327	24.8	75.2		221	26.2	73.8		152	31.6	68.4		78	35.9	64.1	
30-45 years	746	36.3	63.7		597	36.3	63.7		491	34.2	65.8		239	37.7	62.3	
≥ 46 years	462	35.1	64.9		386	34.7	65.3		337	29.7	70.3		184	31.5	68.5	
<b>Gender</b>				<b>0.18</b>				<b>0.09</b>				<b>0.002</b>				<b>0.92</b>
Male	1172	17.7	82.3		1081	13.0	87.0		1025	8.7	91.3		491	13.0	87.0	
Female	3022	19.6	80.4		2770	15.2	84.8		2585	12.2	87.8		1376	12.9	87.1	
<b>Education</b>				<b>&lt;0.001</b>				<b>0.001</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>
≤ 9 years	295	9.8	90.2		267	8.2	91.8		258	4.7	95.3		122	6.6	93.4	
10-12 years	1389	16.6	83.4		1272	13.0	87.0		1189	10.0	90.0		585	9.6	90.4	
13-16 years	1652	21.4	78.6		1505	16.1	83.9		1404	12.5	87.5		724	14.4	85.6	
≥ 17 years	846	21.7	78.3		796	16.5	83.5		748	13.1	86.9		430	17.0	83.0	
<b>Occupational status</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>0.001</b>				<b>0.01</b>
Full time worker	2347	22.2	77.8		2162	16.7	83.3		2022	12.7	87.3		1057	14.9	85.1	
Part-time or home working	593	15.2	84.8		539	12.4	87.6		503	10.5	89.5		251	12.4	87.6	
Welfare recipient	543	18.2	81.8		508	16.1	83.9		474	11.2	88.8		241	12.4	87.6	
Not working (school/unemployed)	711	12.4	87.6		642	7.9	92.1		611	6.9	93.1		318	7.2	92.8	
<b>Cohabitants Smoking</b>				<b>0.12</b>				<b>0.02</b>				<b>0.03</b>				<b>0.02</b>
Yes	1384	17.7	82.3		1267	12.6	87.4		1185	9.5	90.5		611	10.3	89.7	
No	2792	19.7	80.3		2566	15.5	84.5		2409	12.0	88.0		1249	14.1	85.9	
<b>Friends smoking</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>0.002</b>				<b>0.003</b>
Few	1695	22.7	77.3		1549	17.6	82.4		1446	13.5	86.5		760	15.4	84.6	
Many	2376	16.9	83.1		2193	12.7	87.3		2061	9.8	90.2		1054	11.7	88.3	
All	123	11.4	88.6		109	8.3	91.7		103	8.7	91.3		53	1.9	98.1	
<b>Snus use</b>				<b>0.01</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>0.02</b>
Occasionally	590	14.7	85.3		544	7.5	92.5		508	6.1	93.9		253	7.5	92.5	
Daily	247	18.2	81.8		230	14.3	85.7		210	6.2	93.8		102	11.8	88.2	
No	3357	19.9	80.1		3077	15.8	84.2		2892	12.5	87.5		1512	13.9	86.1	
<b>Quit Attempted</b>				<b>0.44</b>				<b>0.04</b>				<b>0.27</b>				<b>0.03</b>
Yes	3595	18.9	81.1		3305	14.1	85.9		3104	11.0	89.0		1588	12.2	87.8	
No	599	20.2	79.8		546	17.4	82.6		506	12.6	87.4		279	16.8	83.2	
<b>Quit support</b>				<b>0.003</b>				<b>0.24</b>				<b>0.99</b>				<b>0.44</b>
Yes	3231	20.0	80.0		2959	14.9	85.1		2772	11.3	88.7		1446	13.3	86.7	
No	943	15.7	84.3		877	13.3	86.7		825	11.3	88.7		414	11.8	88.2	
<b>Social Pressure</b>				<b>0.001</b>				<b>0.01</b>				<b>0.004</b>				<b>0.24</b>
Yes	2301	17.3	82.7		2110	13.2	86.8		1991	9.8	90.2		1003	12.1	87.9	
No	1893	21.2	78.8		1741	16.2	83.8		1619	12.9	87.1		864	13.9	86.1	

<b>Self-efficacy</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>0.29</b>
Very high	664	26.7	73.3		619	20.0	80.0		580	15.9	84.1		330	13.3	86.7	
High	2552	19.8	80.2		2339	15.0	85.0		2183	11.2	88.8		1137	13.6	86.4	
Low	967	11.9	88.1		883	9.6	90.4		837	8.0	92.0		397	10.6	89.4	
<b>Motivation</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>&lt;0.001</b>				<b>0.003</b>
Weak	532	12.2	87.8		484	9.7	90.3		458	7.2	92.8		212	9.9	90.1	
Quite strong	2601	17.0	83.0		2385	13.3	86.7		2247	9.8	90.2		1156	11.7	88.3	
Very strong	1046	27.6	72.4		968	20.1	79.9		891	16.7	83.3		489	17.4	82.6	
<b>Fagerstrom variables</b>																
<b>Early morning smoking<sup>~</sup></b>				<b>0.19</b>				<b>0.81</b>				<b>0.51</b>				<b>0.16</b>
Yes	1845	19.9	80.1		1683	14.7	85.3		1572	10.9	89.1		800	11.8	88.3	
No	2321	18.4	81.6		2143	14.5	85.5		2013	11.6	88.4		1054	13.9	86.1	
<b>Which cigarette<sup>o</sup></b>				<b>0.18</b>				<b>0.04</b>				<b>0.01</b>				<b>0.47</b>
First in the morning	2722	18.5	81.5		2502	13.7	86.3		2344	10.2	89.8		1201	12.6	87.4	
Any other	1452	20.2	79.8		1333	16.3	83.7		1252	13.2	86.8		654	13.8	86.2	
<b>Smoking time from waking<sup>‡</sup></b>				<b>0.001</b>				<b>0.02</b>				<b>0.10</b>				<b>0.57</b>
Within 5 minutes	1021	17.4	82.6		942	12.5	87.5		888	10.7	89.3		469	11.1	88.9	
From 6-30 minutes	1984	17.6	82.4		1811	14.1	85.9		1689	10.7	89.3		845	13.4	86.6	
From 31-60 minutes	797	22.2	77.8		731	16.7	83.3		688	11.3	88.7		362	14.1	85.9	
After 60 minutes/later	387	24.0	76.0		362	18.0	82.0		341	15.2	84.8		188	13.3	86.7	

%=percent

N=number

<sup>~</sup> Do you smoke more early in the day than the rest of the day?

<sup>o</sup> Which cigarette would you hate most to give up? First in the morning or Any other

<sup>‡</sup> How long is it from the time you wake, to your first smoke?

**Table 5**

Multivariate odds ratio (OR) estimates with 95% confidence intervals (CI) for cessation status among study participants at 6 and 12 months.

FOLLOW-UP	INDEPENDENT VARIABLE	N	OR <sup>#</sup>	95% CI
<b>6 MONTHS</b>	<b>Gender<sup>Ω</sup></b>	3481	0.79	0.60-1.03
	<b>Education</b>			
	≤ 9 years <sup>†</sup>	252	1.00 Ref.	
	10-12 years	1148	2.19	1.15-4.17
	13-16 years	1364	2.65	1.40-5.01
	≥ 17 years	717	2.65	1.37-5.11
	<b>Motivation</b>			
	Weak <sup>†</sup>	445	1.00 Ref.	
	Quite strong	2176	1.17	0.79-1.72
	Very strong	860	2.04	1.36-3.06
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	1947	1.00 Ref.	
	Part-time or home working	487	0.84	0.60-1.17
	Welfare recipient	455	0.93	0.66-1.30
	Not working (school/unemployed)	592	0.59	0.42-0.85
	<b>Friends smoking</b>			
	Few <sup>†</sup>	1386	1.00 Ref.	
	Many	2003	0.79	0.63-0.99
	All	92	0.67	0.28-1.58
	<b>Cohabitants smoking<sup>¶</sup></b>	3481	0.81	0.64-1.03
	<b>Social pressure<sup>¶</sup></b>	3481	0.77	0.62-0.96
	<b>Fagerstrom which cigarette<sup>¶¶</sup></b>	3481	0.80	0.64-0.99
<b>Snus use</b>				
No <sup>†</sup>	2792	1.00 Ref.		
Occasionally	488	0.49	0.33-0.74	
Daily	201	0.49	0.27-0.90	
<b>12 MONTHS</b>	<b>Education</b>			
	≤ 9 years <sup>†</sup>	117	1.00 Ref.	
	10-12 years	559	1.37	0.62-2.99
	13-16 years	711	2.25	1.05-4.83
	≥ 17 years	414	2.60	1.19-5.66
	<b>Friends smoking</b>			
	Few <sup>†</sup>	733	1.00 Ref.	
	Many	1019	0.87	0.65-1.16
	All	49	0.14	0.02-1.01
	<b>Motivation</b>			
	Weak <sup>†</sup>	208	1.00 Ref.	
	Quite strong	1118	1.04	0.63-1.71
	Very strong	475	1.66	0.98-2.80
	<b>Quit attempted<sup>¶</sup></b>	1801	0.61	0.43-0.89
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	1022	1.00 Ref.	
Part-time or home working	244	0.83	0.54-1.29	
Welfare recipient	227	0.99	0.63-1.54	
Not working (school/unemployed)	308	0.54	0.34-0.86	



Snus use			
No <sup>†</sup>	1463	1.00	Ref.
Occasionally	241	0.56	0.33-0.93
Daily	97	0.81	0.43-1.53

N = number included in analysis

OR = Odds Ratio

95% CI = confidence interval

<sup>†</sup> Reference group

<sup>#</sup> Adjusted for all the variable in the table where applicable

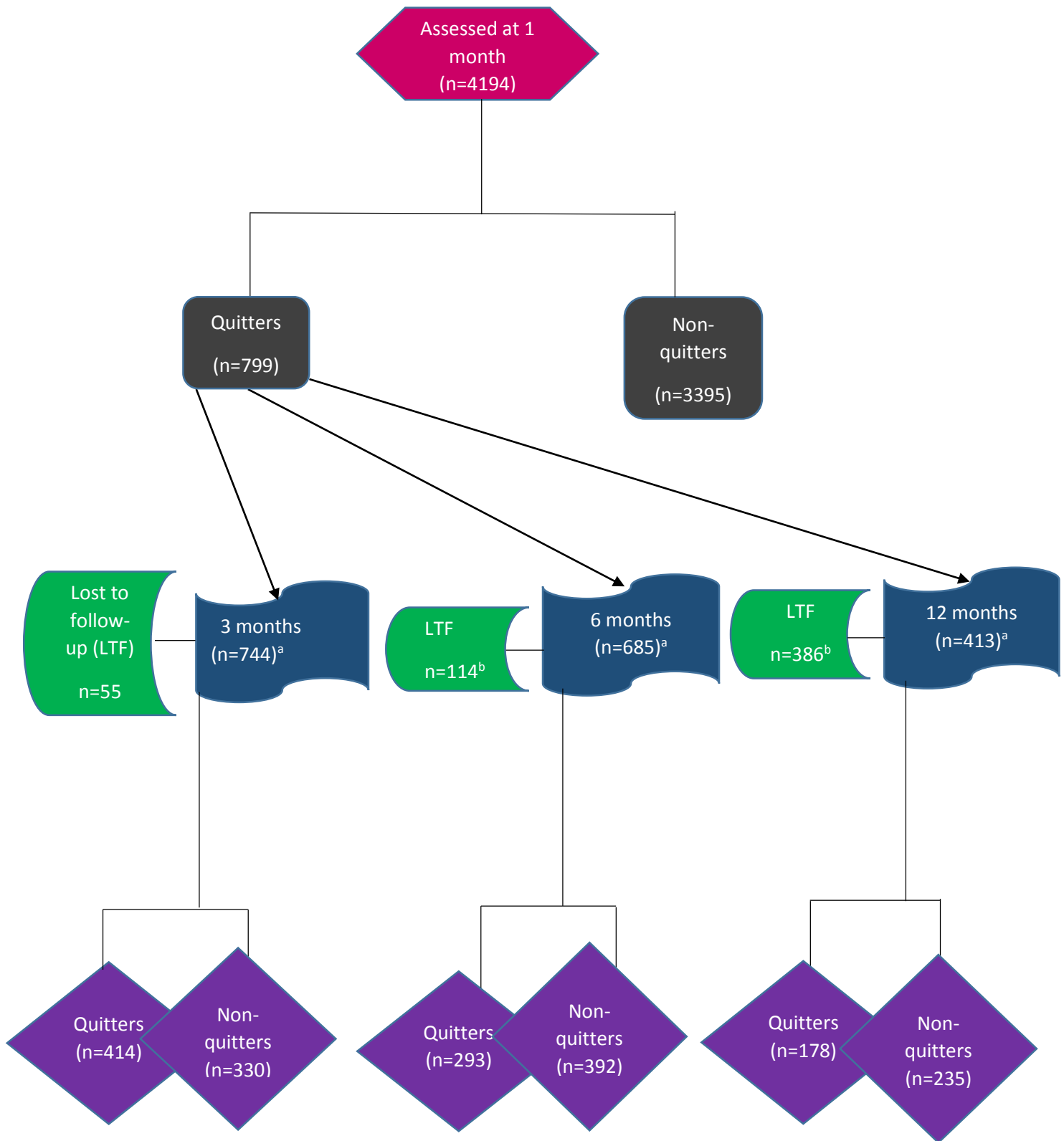
<sup>Ω</sup>The reference group is female

<sup>¶</sup> Reference groups are those who answered “no” or “any other” to the respective questions for each variable.

<sup>°</sup> Which cigarette would you hate most to give up? First in the morning or Any other

**Figure 1.**

Flow chart showing the 799 successful quitters at 1 month who continued to be quitters at 3, 6 and 12 months.



<sup>a</sup> The number of participants who quit at 1 month included in the 3, 6 and 12 months analysis.

<sup>b</sup> The number of participants who quit at 1 month lost to follow-up at each time point.

**Table 6**

Multivariate odds ratio (OR) estimates with 95% confidence intervals (CI) for cessation status among study participants who quit at 1 month and reported to be quitters at 6 months.

<b>FOLLOW-UP</b>	<b>INDEPENDENT VARIABLE</b>	<b>N</b>	<b>OR<sup>#</sup></b>	<b>95% CI</b>
<b>FOR 6 MONTHS</b>	<b>Cohabitants smoking<sup>¶</sup></b>	657	0.64	0.45-0.91
	<b>Snus use</b>			
	No <sup>†</sup>	548	1.00 Ref.	
	Occasionally	72	0.36	0.20-0.63
	Daily	37	0.21	0.09-0.51

N = number included in analysis

OR = Odds Ratio

95% CI = confidence interval

<sup>†</sup> Reference group

<sup>#</sup> Adjusted for all the variables in the table

<sup>¶</sup> Reference groups are those who answered “no” or “any other” to the respective questions for each variable.



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## Supplementary Tables

Table 1

Selected characteristics (%) of those who reported to be quitters at 1, 3, 6 and 12 months compared with those who reported to be smokers.

Variables	Cessation status															
	1 month %				3 months %				6 months %				12 months %			
	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>	N	Quit	Smoke	<i>p</i>
<b>Cohabitants</b>				<b>0.32</b>				<b>0.29</b>				<b>0.69</b>				<b>0.35</b>
Yes	3225	19.4	80.6		2967	14.9	85.1		2774	11.1	88.9		1439	12.5	87.5	
No	969	18.0	82.0		884	13.5	86.5		836	11.6	88.4		428	14.3	85.7	
<b>Anti-depressant</b>				<b>0.02</b>				<b>0.63</b>				<b>0.14</b>				<b>0.15</b>
Yes	1230	16.8	83.2		1126	14.1	85.9		1053	10.0	90.0		542	11.1	88.9	
No	2947	19.9	80.1		2709	14.7	85.3		2541	11.7	88.3		1315	13.5	86.5	
<b>Quitting obstacles</b>				<b>0.51</b>				<b>0.30</b>				<b>0.39</b>				<b>0.95</b>
Missing the Coziness/smoke	1464	20.0	80.0		1344	15.2	84.8		1260	12.3	87.7		660	13.5	86.5	
Cessation side-effects	1229	17.7	82.3		1112	13.1	86.9		1038	10.0	90.0		525	12.8	87.2	
Social concerns/failure	1340	19.3	80.7		1241	15.5	84.5		1163	11.2	88.8		616	12.5	87.5	
None of these	161	18.6	81.4		154	12.3	87.7		149	10.7	89.3		66	12.1	87.9	
<b>Fagerstrom variables</b>																
<b>Nicotine dependence Class</b>				<b>0.03</b>				<b>0.02</b>				<b>0.01</b>				<b>0.54</b>
1-Low	1212	21.4	78.6		1122	16.9	83.1		1057	13.9	86.1		570	13.3	86.7	
2-Moderate	2630	17.8	82.2		2415	13.4	86.6		2257	10.1	89.9		1142	12.5	87.5	
3-High	258	20.5	79.5		235	15.3	84.7		221	10.0	90.0		112	16.1	83.9	
<b>Smoking in prohibited places<sup>€</sup></b>				<b>0.05</b>				<b>0.02</b>				<b>0.04</b>				<b>0.10</b>
Yes	831	16.6	83.4		764	11.9	88.1		719	9.0	91.0		385	10.4	89.6	
No	3334	19.6	80.4		3059	15.2	84.8		2863	11.7	88.3		1464	13.5	86.5	
<b>Smoke when ill/bedridden<sup>§</sup></b>				<b>0.05</b>				<b>0.26</b>				<b>0.11</b>				<b>0.61</b>
Yes	2892	18.3	81.7		2648	14.2	85.8		2488	10.7	89.3		1282	13.3	86.7	
No	1274	20.9	79.1		1182	15.6	84.4		1102	12.5	87.5		573	12.4	87.6	
<b>Number of cigarettes per day</b>				<b>0.31</b>				<b>0.26</b>				<b>0.18</b>				<b>0.87</b>
≤ 10	1109	20.6	79.4		1027	16.0	84.0		964	13.1	86.9		491	12.0	88.0	
11-20	2594	18.5	81.5		2385	14.1	85.9		2235	10.6	89.4		1157	13.1	86.9	
21-30	423	18.9	81.1		375	14.1	85.9		350	10.3	89.7		185	13.5	86.5	
≥ 31	65	13.8	86.2		61	8.2	91.8		58	8.6	91.4		31	16.1	83.9	

%=percent

N=number

<sup>€</sup> Do you have difficulty refraining from smoking where prohibited?

<sup>§</sup> Do you smoke when you are sick or bedridden?

**Table 2**

Multivariate odds ratio (OR) estimates including age data with 95% confidence intervals (CI) for cessation status among study participants at 6 and 12 months.

FOLLOW-UP	INDEPENDENT VARIABLE	N	OR <sup>∞#</sup>	95% CI
6 MONTHS	<b>Gender<sup>Ω</sup></b>	967	0.69	0.49-0.95
	<b>Education</b>			
	≤ 9 years <sup>†</sup>	42	1.00 Ref.	
	10-12 years	268	1.77	0.76-4.08
	13-16 years	411	1.88	0.82-4.32
	≥ 17 years	246	1.75	0.75-4.10
	<b>Motivation</b>			
	Weak <sup>†</sup>	83	1.00 Ref.	
	Quite strong	603	0.83	0.50-1.39
	Very strong	281	1.43	0.83-2.46
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	619	1.00 Ref.	
	Part-time or home working	103	1.17	0.74-1.84
	Welfare recipient	141	0.68	0.44-1.07
	Not working (school/unemployed)	104	0.75	0.46-1.25
	<b>Cohabitants smoking<sup>¶</sup></b>	967	0.72	0.52-0.98
	<b>Social pressure<sup>¶</sup></b>	967	0.92	0.69-1.22
	<b>Fagerstrom which cigarette<sup>¶¶</sup></b>	967	0.95	0.71-1.28
	<b>Snus use</b>			
	No <sup>†</sup>	807	1.00 Ref.	
	Occasionally	109	0.45	0.27-0.76
	Daily	51	0.36	0.16-0.80
	<b>Friends smoking</b>			
Few <sup>†</sup>	486	1.00 Ref.		
Many	467	1.05	0.79-1.40	
All	14	1.93	0.63-5.92	
12 MONTHS	<b>Education</b>			
	≤ 9 years <sup>†</sup>	24	1.00 Ref.	
	10-12 years	135	0.94	0.35-2.50
	13-16 years	206	1.41	0.54-3.69
	≥ 17 years	134	1.21	0.45-3.24
	<b>Friends smoking</b>			
	Few <sup>†</sup>	247	1.00 Ref.	
	Many	246	1.08	0.74-1.59
	All	6	0.26	0.03-2.46
	<b>Motivation</b>			
	Weak <sup>†</sup>	37	1.00 Ref.	
	Quite strong	310	0.95	0.45-2.00
	Very strong	152	1.42	0.65-3.11
	<b>Quit attempted<sup>¶</sup></b>	499	0.45	0.26-0.78
	<b>Occupational status</b>			
Full time worker <sup>†</sup>	311	1.00 Ref.		
Part-time or home working	55	1.07	0.58-1.97	
Welfare recipient	73	0.87	0.48-1.57	
Not working (school/unemployed)	60	0.58	0.30-1.14	

Snus use			
No <sup>†</sup>	420	1.00 Ref.	
Occasionally	53	0.47	0.24-0.95
Daily	26	0.63	0.25-1.57

N = number included in analysis

OR = Odds Ratio

95% CI = confidence interval

<sup>†</sup> Reference group

<sup>#</sup> Adjusted for all the variables in the table where applicable

<sup>∞</sup> Analysis included age

<sup>Ω</sup> The reference group is female

<sup>¶</sup> Reference groups are those who answered “no” or “any other” to the respective questions for each variable.

<sup>°</sup> Which cigarette would you hate most to give up? First in the morning or Any other

**Table 3**

Multivariate odds ratio (OR) estimates with 95% confidence intervals (CI) for cessation status among study participants at 1 and 3 months.

FOLLOW-UP	INDEPENDENT VARIABLE	N	OR <sup>#</sup>	95% CI
<b>1 MONTH</b>	<b>Education</b>			
	≤ 9 years <sup>†</sup>	285	1.00 Ref.	
	10-12 years	1326	1.67	1.10-2.53
	13-16 years	1589	2.03	1.35-3.07
	≥ 17 years	806	2.06	1.34-3.17
	<b>Friends smoking</b>			
	Few <sup>†</sup>	1609	1.00 Ref.	
	Many	2285	0.80	0.67-0.94
	All	112	0.57	0.30-1.10
	<b>Motivation</b>			
	Weak <sup>†</sup>	516	1.00 Ref.	
	Quite strong	2494	1.08	0.81-1.46
	Very strong	996	1.82	1.32-2.51
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	2234	1.00 Ref.	
	Part-time or home working	569	0.68	0.53-0.88
	Welfare recipient	518	0.93	0.72-1.20
	Not working (school/unemployed)	685	0.58	0.45-0.75
	<b>Quit support<sup>¶</sup></b>	4006	1.26	1.02-1.55
	<b>Social pressure<sup>¶</sup></b>	4006	0.80	0.68-0.94
	<b>Fagerstrom early smoking<sup>¶¶</sup></b>	4006	1.26	1.06-1.49
	<b>Self-efficacy</b>			
	Low <sup>†</sup>	932	1.00 Ref.	
High	2441	1.44	1.13-1.83	
Very high	633	1.64	1.22-2.21	
<b>Fagerstrom smoking time from waking<sup>¶</sup></b>				
Within 5 minutes	978	1.00 Ref.		
From 6-30 minutes	1904	1.01	0.82-1.24	
From 31-60 minutes	757	1.24	0.96-1.60	
After 60 minutes/later	367	1.36	0.99-1.87	
<b>3 MONTHS</b>	<b>Education</b>			
	≤ 9 years <sup>†</sup>	257	1.00 Ref.	
	10-12 years	1225	1.59	0.98-2.57
	13-16 years	1462	1.96	1.21-3.16
	≥ 17 years	763	1.83	1.11-3.02
	<b>Friends smoking</b>			
	Few <sup>†</sup>	1482	1.00 Ref.	
	Many	2127	0.81	0.67-0.98
	All	98	0.50	0.22-1.10
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	2086	1.00 Ref.	
	Part-time or home working	518	0.78	0.58-1.05
	Welfare recipient	486	1.06	0.80-1.40
Not working (school/unemployed)	617	0.52	0.38-0.72	
<b>Motivation</b>				
Weak <sup>†</sup>	473	1.00 Ref.		

Quite strong	2305	1.15	0.82-1.62
Very strong	929	1.67	1.15-2.42
<b>Snus use</b>			
No <sup>†</sup>	2966	1.00 Ref.	
Occasionally	520	0.49	0.34-0.69
Daily	221	0.99	0.67-1.46
<b>Quit attempted<sup>¶</sup></b>	3707	0.72	0.56-0.93
<b>Age start smoking (years)</b>	3680	1.03	1.00-1.05
<b>Self-efficacy</b>			
Low <sup>†</sup>	852	1.00 Ref.	
High	2260	1.32	1.01-1.73
Very high	595	1.62	1.16-2.26
<b>Social pressure<sup>¶</sup></b>	3707	0.83	0.69-1.00

N = number included in analysis

OR = Odds Ratio

95% CI = confidence interval

<sup>†</sup> Reference group

# Adjusted for all the variables in the table where applicable

<sup>¶</sup> Reference groups are those who answered “no” or “any other” to the respective questions for each variable.

≈ Do you smoke more early in the day than the rest of the day?

¥ How long is it from the time you wake, to your first smoke?

**Table 4**

Multivariate odds ratio (OR) estimates including age data with 95% confidence intervals (CI) for cessation status among study participants at 1 and 3 months.

FOLLOW-UP	INDEPENDENT VARIABLE	N	OR <sup>∞#</sup>	95% CI
<b>1 MONTH</b>	<b>Education</b>			
	≤ 9 years <sup>†</sup>	75	1.00 Ref.	
	10-12 years	463	1.47	0.80-2.71
	13-16 years	638	1.87	1.02-3.43
	≥ 17 years	333	1.84	0.98-3.45
	<b>Friends smoking</b>			
	Few <sup>†</sup>	720	1.00 Ref.	
	Many	756	0.96	0.76-1.20
	All	33	0.82	0.35-1.90
	<b>Motivation</b>			
	Weak <sup>†</sup>	150	1.00 Ref.	
	Quite strong	933	1.23	0.80-1.88
	Very strong	426	1.97	1.24-3.13
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	920	1.00 Ref.	
	Part-time or home working	188	0.84	0.59-1.19
	Welfare recipient	202	0.73	0.51-1.04
	Not working (school/unemployed)	199	0.73	0.50-1.06
	<b>Quit support<sup>¶</sup></b>	1509	1.27	0.96-1.67
	<b>Social pressure<sup>¶</sup></b>	1509	0.76	0.61-0.95
	<b>Fagerstrom early smoking<sup>¶¶</sup></b>	1509	1.26	1.00-1.59
	<b>Self-efficacy</b>			
	Low <sup>†</sup>	289	1.00 Ref.	
	High	946	1.35	0.98-1.88
Very high	274	1.41	0.94-2.11	
<b>Fagerstrom smoking time from waking<sup>¶</sup></b>				
Within 5 minutes	330	1.00 Ref.		
From 6-30 minutes	727	0.84	0.63-1.12	
From 31-60 minutes	311	1.00	0.71-1.42	
After 60 minutes/later	141	1.22	0.78-1.89	
<b>3 MONTHS</b>	<b>Education</b>			
	≤ 9 years <sup>†</sup>	48	1.00 Ref.	
	10-12 years	355	1.67	0.78-3.55
	13-16 years	504	1.94	0.92-4.09
	≥ 17 years	287	1.57	0.73-3.38
	<b>Friends smoking</b>			
	Few <sup>†</sup>	583	1.00 Ref.	
	Many	592	0.94	0.73-1.21
	All	19	0.81	0.29-2.23
	<b>Occupational status</b>			
	Full time worker <sup>†</sup>	750	1.00 Ref.	
	Part-time or home working	137	0.99	0.66-1.48
Welfare recipient	172	0.91	0.63-1.32	
Not working (school/unemployed)	135	0.57	0.36-0.91	



<b>Motivation</b>			
Weak <sup>†</sup>	106	1.00 Ref.	
Quite strong	734	1.03	0.64-1.64
Very strong	354	1.53	0.92-2.55
<b>Snus use</b>			
No <sup>†</sup>	983	1.00 Ref.	
Occasionally	142	0.56	0.36-0.85
Daily	69	0.84	0.49-1.45
<b>Quit attempted<sup>¶</sup></b>	1194	0.53	0.37-0.75
<b>Age start smoking (years)</b>	1167	1.03	0.99-1.06
<b>Self-efficacy</b>			
Low <sup>†</sup>	209	1.00 Ref.	
High	754	1.18	0.82-2.00
Very high	231	1.28	0.82-1.69
<b>Social pressure<sup>¶</sup></b>	1194	0.90	0.70-1.15

N = number included in analysis

OR = Odds Ratio

95% CI = confidence interval

<sup>†</sup> Reference group

<sup>#</sup> Adjusted for all the variables in the table where applicable

<sup>∞</sup> Analysis included age

<sup>¶</sup> Reference groups are those who answered “no” or “any other” to the respective questions for each variable.

<sup>≈</sup> Do you smoke more early in the day than the rest of the day?

<sup>¥</sup> How long is it from the time you wake, to your first smoke?

# Appendix I

The questions for some of the baseline characteristics used in the study (Translated from Norwegian).

<b>Variable</b>	<b>Question</b>
<b>Education</b>	What is your highest completed school/education?
<b>Occupational status</b>	What is your main employment?
<b>Snus use</b>	Do you use snus?
<b>Cohabitants</b>	Do you live with anyone?
<b>Cohabitants smoking</b>	Does someone you live with smoke?
<b>Friends smoking</b>	Do you have friends who smoke?
<b>Age start smoking</b>	How old were you when you started smoking permanently?
<b>Anti-depressant</b>	Have you ever taken medication for depression?
<b>Quit attempted</b>	Have you tried to quit smoking before?
<b>Quit attempts</b>	How many times have you tried to stop earlier?
<b>Quit support</b>	Do you have anyone that can support you when you stop smoking?
<b>Quitting obstacles</b>	What do you see as the biggest obstacle to quit smoking?
<b>Social pressure</b>	Is someone trying to persuade you to stop smoking?
<b>Self-efficacy</b>	How do you think it's going to go to stop smoking now?
<b>Motivation</b>	How strong is your motivation to stop smoking?
<b>Fagerstrom smoking time from waking</b>	How long is it from the time you wake, to your first smoke?
<b>Fagerstrom early smoking or (early morning smoking)</b>	Do you smoke more early in the day than the rest of the day?
<b>Fagerstrom prohibited or (smoking in prohibited places)</b>	Do you have difficulty refraining from smoking where it is prohibited?
<b>Fagerstrom illness or (smoke when ill/bedridden)</b>	Do you smoke when you are sick or bedridden?
<b>Fagerstrom which cigarette</b>	Which cigarette would you hate most to give up?
<b>Quitting reasons</b>	What are your strongest reasons to quit smoking?
<b>Diagnoses</b>	Have you ever received any of the following diagnoses?

