Title: Understanding the association between spontaneous quit attempts and improved smoking cessation success rates: a population survey in England with six-month follow-up

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Abstract

Introduction: Almost half of smoking quit attempts are 'spontaneous' (initiated as soon as the decision to quit has been made) and are associated with increased success rates. This study aimed to assess to what extent other factors may account for this association.

Methods: Data were used from respondents to a survey representative of the adult population in England from 2006 to 2016. We included 2,018 respondents who were current smokers at baseline and had attempted to quit between baseline and six-month follow-up. Logistic regression models assessed the association between quit success and spontaneous quit attempts while adjusting for smoking, sociodemographic and quit attempt characteristics.

Results: Spontaneous quit attempts were associated with greater odds of quit success (OR=1.31, 95%CI=1.07-1.60) but the association was not significant in the fully adjusted model (OR_{adj}=1.19, 95%CI=0.95-1.49). In this adjusted model, those who attempted to quit without cutting down first (OR_{adj}=3.08, 95%CI=2.46-3.88) and were male (OR_{adj}=1.44, 95%CI=1.16-1.80) had greater odds of success; while a greater number of attempts in the past 6 months, stronger urges to smoke (strong vs. none), higher daily cigarette consumption, and lower social grade (E vs. AB) were associated with lower odds of success (OR_{adj} range=0.32–0.98, p<.030). Quit attempts made without cutting down first were correlated with spontaneous quit attempts (r=0.150, p<.001) and appeared to account for the diminished association between spontaneous quitting and success (OR_{adj}=1.18, 95%CI=0.96-1.46).

Conclusions: The increased success rate of spontaneous quit attempts appears to be because spontaneous quit attempts are more likely to be made without cutting down first.

Implications

The apparent benefit of spontaneous over planned quit attempts may be attributable to the former being more likely to involve quitting without cutting down first (i.e. abrupt cessation) than cutting down first (i.e. gradual cessation) and so this may be a more useful target for advice to improve the chances of successful quitting.

INTRODUCTION

Smoking is a major public health problem and causes a wide range of diseases.[1] Almost half (45.8%) of quit attempts are spontaneous, meaning that a smoker tries to quit as soon as they make the decision.[2] Spontaneous quit attempts have been found to be associated cross-sectionally with a greater chance of success compared with quit attempts that have been planned to take place in the future, even after adjusting for sociodemographic factors.[2] It remains possible that the difference is due to other unmeasured confounding factors, particularly other attributes of the quit attempt and level of cigarette dependence. This study aimed to assess whether spontaneous quit attempts are associated with increased likelihood of success after controlling for a wider range of potential confounders than has been assessed previously.

It is crucial to understand the factors associated with successful quit attempts as this has important implications for recommendations to individuals trying to quit smoking. Making a spontaneous quit attempt is one such factor associated with improved quit success.[2,3] Spontaneous quit attempts among smokers in England are between 2 and 3 times more likely to succeed than planned attempts, after adjusting for age, sex and socioeconomic status.[2] This has also been found in Canada, where 51% of quit attempts are spontaneous and successful quit attempts were more likely to be spontaneous[3] and a separate retrospective study in Canada found that planned quit attempts did not increase the likelihood of quit success.[4] However, other important predictors of quit success were not adjusted for in either of these studies. The International Tobacco Control (ITC) Four country study did adjust for potential confounders such as cigarette dependence and use of aids during a quit attempt alongside sociodemographic factors and subsequently found no clear effects of spontaneous quit attempts on quit success rates across different waves of the survey.[5,6] However, the ITC study found that only 19% of quit attempts were spontaneous,[5] compared with other studies that have found around half of quit attempts were spontaneous.[2,3] It is unclear why their results differ so markedly.[5] In the US, it has been found that delaying a quit attempt prospectively predicted lower quit success.[7] In addition to this, among moderate and heavy smokers in the US, the impact of spontaneous quit attempts on quit success interacted with race: among white smokers, spontaneous quit attempts were associated with a longer period of abstinence whilst among black smokers, spontaneous quit attempts were associated with a shorter period of abstinence.[8] However, no significant differences were detected in the impact of spontaneous quit attempts on abstinence among light or nondaily smokers.[8] Therefore, more evidence is required on whether spontaneous quit attempts are independently associated with improved success rates after adjusting for potential confounders.

There are a number of known factors that predict quit success, including lower levels of cigarette dependence[9–11] and the strength of urges to smoke.[12] It is important to assess cigarette dependence and strength of urges to smoke prospectively as these can be underestimated if assessed retrospectively among ex-smokers. Quit success is also positively associated with general cessation behaviours such as having made fewer quit attempts in the past year, the time since the attempt was initiated, and quit attempts made without cutting down first.[5,13–15] Quit attempts made without cutting down first are sometimes termed 'abrupt', while

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quit attempts in which the smoker cuts down first are sometimes called 'gradual'. Quit attempts made with or without cutting down first can both be part of either a spontaneous or planned quit attempt (see Table 1 for definitions). Use of behavioural or specialist NHS support, including pharmacotherapy, are known to improve the likelihood of quit success, compared with unaided quit attempts,[13,16] despite requiring planning. In the UK, there is evidence that higher social grade is associated with quit success.[10,13] No association between quit success and sex was found in a systematic review,[10] though the effects were heterogeneous across studies. The evidence of an association between quit success and age was inconsistent in a review[10] with some studies finding that quit success is associated with older age.[13]

As there is mixed evidence about whether spontaneous quit attempts are associated with improved success rates after appropriately adjusting for potential confounders, it is important to understand which, if any, of these confounders account for this association. This study used data from a large, nationally representative population survey in England to assess the association between spontaneous quit attempts and quit success, after adjusting for a range of potential confounders.

Research questions

1. Are spontaneous quit attempts associated with improved success rates among adult smokers in England?
2. Are spontaneous quit attempts independently associated with improved success rates among adult smokers in England, adjusting for other known predictors of success rates?
3. If spontaneous quit attempts are not independently associated with improved success rates, which of the potential confounders account(s) for the association?

METHODS

Design and study population

The Smoking Toolkit Study (STS) is an ongoing, monthly, population survey in England. The STS consists of cross-sectional household surveys of nationally representative samples of 1700-1800 adults (aged 16+) in England.[17] The study sampling is a hybrid of random probability and simple quota – England is split into more than 170,000 areas (consisting of approximately 300 households each) stratified according to a geodemographic analysis of the population. Areas are then randomly allocated to interviewers who conduct interviews within that area until the quota is fulfilled.

The study used data from November 2006 until September 2016 from responders who were current smokers at baseline and had attempted to quit between baseline and six-month follow-up. There was missing data between April 2012 and August 2014 when six-month follow-up data were not collected.

The required sample size was 495, based on a power calculation with the following parameters: power=.80, alpha=.05, OR=2.0 (based on results from West & Sohal[2]).

Measures

Explanatory variable: Spontaneous quit attempt was measured at six-month follow-up with the question 'Which of the following applies to your most recent serious quit attempt?' Respondents had two options: 'I started the quit attempt the moment I made the decision I was going to stop' (spontaneous) or 'I planned the quit for later the same day or for a date in the future' (planned).

Outcome variable: Quit success was measured at six-month follow-up by self-reported smoking status with two options: successful or unsuccessful.

Covariates: Quit attempt characteristics were measured at six-month follow up and were related to quit attempts between baseline and follow up. Quit attempt made without cutting down first was assessed with the question 'Did you cut down the amount you smoked before trying to stop completely at your most recent serious quit attempt?' and two options: 'Stopped without cutting down' or 'Cut down first'. Time since start of most recent quit attempt (last week/between a week and a month/1-2 months/2-3 months/3-6 months) and number of quit attempts in past 6 months (1/2/3 or more) were both categorical variables. Use of evidence-based aids during most recent quit attempt was dichotomous (no/yes); evidence-based aids included prescription nicotine replacement therapy (NRT), NRT over-the-counter (OTC), varenicline, bupropion, e-cigarettes, and face-to-face support.

Smoking and sociodemographic characteristics were measured at baseline. Smoking characteristics measured were: strength of urges (categorical: slight/moderate/strong/very strong/extremely strong); and daily cigarette consumption (continuous; indicating cigarette dependence). Sociodemographic characteristics measured were: age (16-24/25-34/35-44/45-54/55-64/65+); sex; social grade (AB: higher and intermediate managerial, administrative or professional/ C1: supervisory, clerical and junior managerial, administrative or professional/ C2: skilled manual workers /D: semi and unskilled manual workers/ E: state pensioners, lowest-grade workers or unemployed); year (continuous, 2006 through to 2016) and month of survey (continuous, 1: January through to 12: December).

Analysis

All analyses were conducted in R with complete cases for all variables of interest. The protocol and analysis plan were pre-registered on Open Science Framework (https://osf.io/g9h3b/). A series of unadjusted binary logistic generalised linear models (GLM) were conducted to assess the univariate association between the outcome variable (quit success) and each of the explanatory variable (spontaneous quit attempt) and covariates. An adjusted GLM was conducted with the outcome variable (quit success) regressed on to the explanatory variable (spontaneous quit attempt) and all covariates. Continuous variables were transformed by dividing the original variable by the standard deviation to express the variable as a proportion of the standard deviation.

If the adjusted GLM accounted for any unadjusted association between spontaneous quit attempt and quit success, then a series of additional GLMs were planned to identify the key confounder variable. A correlation matrix between the dichotomous explanatory variable (spontaneous quit attempt) and all covariates was inspected to assess the collinearity between variables. The correlation matrix reported tetrachroic correlations for two dichotomous variables (quit attempt made without cutting down first; use of evidence-based aids during quit attempt; sex) and point-biserial for one dichotomous variable and one continuous (daily cigarette consumption; survey year; survey month) or categorical (time since start of most recent quit attempt; number of quit attempts in past 6 months; strength of urges; age; social grade) variable.

The correlation matrix and adjusted GLM informed which covariates were tested for confounding (i.e. significantly correlated with the explanatory variable and associated with the outcome variable). Quit success was then regressed on to two variables: i) spontaneous quit attempt and ii) any covariates identified as potential confounders.

Bayes Factors (BFs) were calculated to examine for non-significant results whether the associations indicated evidence of no effect or data being insensitive to detect an effect, and for significant results, the strength of evidence.[18] Alternative hypotheses were represented by half normal distributions and the absolute expected effect size for the quit success outcome was set to OR=2.0 in the observed direction (i.e. OR=2.0 for observed ORs>1 and OR=0.5 for observed ORs<1) based on previous research.[2,3] BFs ≥3 provide evidence for the alternative hypothesis, BFs ≤0.33 provide evidence for the null hypothesis, and 0.33<BFs<3 indicate the data are insensitive to detect an effect.[19,20]

Ethics

Ethical approval for the STS was granted by the UCL Ethics Committee (ID 2808/005). The data are not collected by UCL and are anonymized when received by UCL.

RESULTS

Of 33,646 current smokers with complete data at baseline during the study period, 7,302 were followed-up (a comparison of the sociodemographic and smoking characteristics of the baseline and follow-up samples are summarised in Supplementary Table 1). Of the 7,302 current smokers followed-up, a total of 2,018 adults aged 16 and over were included in the analytic sample. Table 2 reports descriptive statistics on the sociodemographic, smoking and quitting behaviour characteristics. Respondents had a mean age of 46 years, over half (54.5%) were female and the most common social grade was E (25.1%). About half of quit attempts were spontaneous (49.0%) and were made without cutting down first (48.9%). The most common time since the start of their most recent quit attempt was three to six months (31.4%). The majority of respondents had only made one quit attempt in the past six months (69.5%) and almost half reported moderate strength of urges (46.8%). The mean daily cigarette consumption was 13.1 and over half had used evidence-based aids during their quit attempt (58.4%).

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Are spontaneous quit attempts associated with improved success rates among adult smokers in England?

Spontaneous quit attempts were associated with a greater likelihood of quit success (see Table 3). Greater likelihood of quit success was also associated with quit attempts made without cutting down first and time since start of most recent quit attempt (three to six months compared with last week). Number of quit attempts in past 6 months, strength of urges (strong compared with none) and daily cigarette consumption were all negatively associated with likelihood of quit success. Males were also more likely to have a successful quit attempt and those of social grade E were less likely to have a successful quit attempt compared with those of social grade AB. Survey year and month were both positively associated with the likelihood of quit success. An unplanned sensitivity analysis (conducted following external peer-review) in which a log binomial GLM was conducted (see Supplementary Table 2) found no difference in the pattern of associations in the unadjusted models between relative risk and odds ratios.

Are spontaneous quit attempts independently associated with improved success rates among adult smokers in England, adjusting for other known predictors of success rates? If not, which of the potential confounders accounts for the association?

No independent association between spontaneous quit attempts and improved success rates was detected (see Table 3) and the Bayes Factor calculated indicated that the data were insensitive to detect an effect ($BF_{HN}=0.94$). Quit success was independently positively associated with an attempt made without cutting down first and being male, and the Bayes Factors calculated provided extremely strong evidence for these positive associations ($BFs_{HN}>58.35$). Quit success was independently positively associated with survey month though the Bayes Factor indicated that the data were insensitive to detect an effect ($BF_{HN}=1.75$). A sensitivity analysis (conducted following internal peer-review) in which survey month was transformed from a continuous into a categorical (year quarters) variable found no difference in the pattern of associations in the adjusted model.

Quit success was negatively associated with number of quit attempts in past 6 months, strength of urges (strong vs. none), daily cigarette consumption, and social grade (E vs. AB). The Bayes Factors calculated provide extremely strong evidence for the association between quit success and number of quit attempts in the past six months ($BFs_{HN}>6,678$) and provide moderate evidence for the association between quit success and strength of urges ($BF_{HN}=5.68$), social grade ($BF_{HN}=5.65$), and daily cigarette consumption ($BF_{HN}=11.44$).

Spontaneous quit attempts was correlated with quit attempt made without cutting down first ($r=0.150$, $p<.001$), strength of urges ($r=0.052$, $p=.020$), daily cigarette consumption ($r=0.094$, $p<.001$), use of aids ($r=0.230$, $p<.001$), and social grade ($r=-0.053$, $p=.017$) (see Supplementary Table 3). Of these variables significantly correlated with spontaneous quit attempts, the following four variables were also independently associated with quit success: i) quit attempt made without cutting down first; ii) strength of urges; iii) daily

cigarette consumption; and iv) social grade. These variables were regressed onto quit success with spontaneous quit attempt in four separate models (see Table 4).

Spontaneous quit attempts was not significantly associated with quit success in model one only, where spontaneous quit attempts and quit attempt made without cutting down first were regressed onto quit success, though the Bayes Factor calculated (BF_{HN}=0.94) indicated the data were insensitive to detect an effect. The positive association between quit success and quit attempt made without cutting down first remained in model one and the Bayes Factor provided extremely strong evidence for the association (BF_{HN}>10,000). The significant association between spontaneous quit attempts and quit success remained for models two, three and four, though the Bayes Factor for model three indicated that the data were insensitive to detect an effect. An unplanned sensitivity analysis (conducted following external peer-review) in which a log binomial GLM was conducted (see Supplementary Table 4) found no difference in the pattern of associations in these adjusted models between relative risk and odds ratios.

Exploratory analysis

An exploratory analysis was conducted to assess whether there was an association between quit success and spontaneous quit attempts when stratified by whether the respondents quit without or with cutting down first (see Supplementary Table 5 and Supplementary Figure 1). Of the respondents who had quit without cutting down first (n=986), 54.0% (n=532) had quit spontaneously and 37.4% (n=199) of these had quit successfully compared with 34.1% (n=155) of those who had not quit spontaneously. Of those who had quit with cutting down first (n=1032), 44.2% (n=456) had quit spontaneously and 16.4% (n=75) of these had quit successfully compared with 13.7% (n=79) of those who had not quit spontaneously. No significant association was detected between spontaneous quit attempts and quit success for respondents who quit without cutting down first (OR=1.15, 95% CI=0.89– 1.50, p=0.287) or for those who quit with cutting down first (OR=1.24, 95% CI=0.88– 1.75, p=.222). The Bayes Factor indicated that the data were insensitive to detect an effect for the association between those respondents who quit either with or without cutting down first (BF_{HN} range=0.55– 0.89). However, no significant interaction effect was detected in a fully adjusted logistic regression model including an interaction between spontaneous quit attempts and whether the respondent quit without cutting down first (OR=0.85, 95% CI=0.54–1.33, p=.465).

DISCUSSION

Spontaneous quit attempts were associated with the likelihood of quit success among adult smokers in England, but no association independent of other known predictors of quit success was detected between spontaneous quit attempts and improved success rates. Attempting to quit without cutting down first and being male were both independently, positively associated with quit success. The number of quit attempts in the past six months, strength of urges (strong compared with none), daily cigarette consumption and social grade (E compared with AB) were all independently, negatively associated with quit success. Quit attempts made without cutting down was correlated with spontaneous quit attempts and when both were regressed

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onto quit success, quit attempts made without cutting down accounted for the univariate association between spontaneous quit attempts and quit success.

About half of quit attempts were spontaneous (49.0%) in this study, which reflects what has been found in other studies.[2,3] Spontaneous quit attempts were associated with quit success in a univariate model, similar to previous research.[2,3] However, no association was detected between spontaneous quit attempts and quit success amongst adult smokers in England where other known predictors were adjusted for. An exploratory analysis stratified by those respondents who had made a quit attempt without or with cutting down first found no association between quit success and spontaneous quit attempts. This provides further support for the conclusion that making a quit attempt without cutting down is more important for quit success than making a spontaneous quit attempt. However, the Bayes Factors for the exploratory analyses indicated that the data were insensitive to detect an effect and so further research in this area is warranted.

This study replicated previous findings that quit success is positively associated with attempting to quit without cutting down first,[5,13,14] and negatively associated with number of quit attempts in the past six months,[5,13,14] strength of urges,[12] cigarette dependence,[9–11] and social grade (E vs. AB).[10,13] There were also contradictions between the findings from this study and previous research. This study found a significant positive association between being male and quit success that was supported by the Bayes Factor calculated, which is not in line with previous research.[10] Therefore, the evidence on whether there is an association between quit success and sex remains inconclusive. This study also found no association between quit success and age, time since quit attempt was initiated and use of evidence-based aids, and the Bayes Factors indicated that the data were insensitive to detect an effect. This is contrary to some previous research that found quit success is associated with older age [13], longer time since quit attempt was initiated,[5,13,14] and use of evidence-based aids.[13,16] These findings highlight that the evidence is still inconclusive and further research is needed to better understand these associations.

A major strength of this study is that the sample were from a large, nationally representative population survey in England and therefore these findings are likely to be generalizable to the population of smokers in England. The sample consisted of individuals who were current smokers at baseline and had made a quit attempt between baseline and the six-month follow-up survey. Therefore, at the follow-up survey individuals could be current smokers (unsuccessful quit attempt) or ex-smokers (successful quit attempt). To avoid potential underestimation among ex-smokers, cigarette dependence (indicated by daily cigarette consumption) and strength of urges to smoke were assessed prospectively at baseline, rather than retrospectively at follow-up.

A limitation of this study was that there was a reliance on recall data for quitting behaviour characteristics, which involved recall of the past six months, introducing scope for bias. Another limitation is that it was not possible to compare the analytic sample - respondents at follow-up who had made a quit attempt in the past 6 months - with those who were not followed-up and who had made an attempt to stop in the 6 months

between baseline and follow-up. Attempts during that period were unknown because respondents were not followed-up. The overall process of following up only recontacts 21.7% and results in a sample that differs from baseline (see Supplementary Table 1). However, the pattern of differences between those who had and had not attempted to quit in the six months previously were broadly similar at both baseline and six-month follow-up (see Supplementary Table 4). Another limitation is that smokers may have interpreted the questions relating to spontaneous quit attempts and quit attempts without cutting down differently. Spontaneous quit attempts are those that started the moment the decision to stop was made whilst planned quit attempts refer to any quit attempt that did not start immediately, either starting later that same day or for a date in the future. It may be that some respondents interpreted the term 'planned' as requiring some form of formal preparation for the quit attempt (e.g. buying nicotine replacement therapy and choosing a quit date), whilst simply waiting, potentially for more favourable conditions, is also defined as a planned quit attempt. Similarly, confusion may arise from spontaneous quit attempts in which the respondent cut down first; these are defined as 'attempted to begin the process of stopping smoking the moment the decision to stop was made by reducing consumption, or after a period of reduction had already taken place' (see Table 1). However, some respondents may have classed their spontaneous quit attempt as without cutting down first if a period of reduction had already taken place.

This study has important practical implications in that smokers should be encouraged to quit without cutting down first i.e. 'abruptly' as this is associated with greater likelihood of quit success. This recommendation is in line with the National Centre for Smoking Cessation and Training (NCSCT) Standard Treatment Programme[21] in the UK and US guidelines, which encourage total abstinence after the quit date.[22]

In addition, smokers of social grade E, those who have a higher daily cigarette consumption and those who have made more quit attempts in the past six months are likely to require additional support to achieve a successful quit attempt. The adjusted models included the use of evidence-based aids, which covered prescription NRT, NRT OTC, varenicline, bupropion, e-cigarettes, and face-to-face support. It is possible that the use of different evidence-based aids has different consequences for the relationship between a spontaneous quit attempt and success. A future study with larger numbers could address this issue. Insofar that it were true, changes in the popularity of different aids – such as the rapid rise in use of e-cigarettes in England around 2011/2012 – would likely affect the overall association observed between spontaneous quit attempts and success.[23]

About half of quit attempts made among adult smokers in England between 2006 and 2016 were spontaneous. Spontaneous quit attempts were associated with improved rates of quit success though this association was not detected when adjusting for other known predictors of quit success. Attempting to quit without cutting down first was independently associated with increased likelihood of quit success and this association appeared to account for the positive univariate association between spontaneous quit attempts and quit success.

Declaration of interests:

CG has no competing interests. JB has received unrestricted research grants from Pfizer related to smoking cessation. RW has received research funding and undertaken consultancy for companies that manufacture smoking cessation medications. LS is a HEFCE funded member of staff at University College London. He has received honoraria for talks, an unrestricted research grant and travel expenses to attend meetings and workshops from Pfizer and an honorarium to sit on advisory panel from Johnson&Johnson, both pharmaceutical companies that make smoking cessation products. He has acted as paid reviewer for grant awarding bodies and as a paid consultant for health care companies. Other research has been funded by the government, a community-interested company (National Centre for Smoking Cessation) and charitable sources. He has never received personal fees or research funding of any kind from alcohol, electronic cigarette or tobacco companies. TR has received honoraria from Pfizer, Novartis, Glaxo Smith Kline, Astra Zeneca and Roche as a speaker in activities related to continuing medical education. He has also received financial support for investigator-initiated trials from Pfizer and Johnson & Johnson.

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Tables

Table 1: Definitions of spontaneous versus planned and with cutting down first (abrupt) versus not (gradual) quit attempts

Quit attempts	Without cutting down first (abrupt)	With cutting down first (gradual)
Spontaneous (quit at the moment the decision was made)	*Attempted to cease all smoking the moment the decision to stop was made*	*Attempted to begin the process of stopping smoking the moment the decision to stop was made by reducing consumption, or after a period of reduction had already taken place*
Planned (for later the same day or in the future)	*Attempted to cease smoking in one step but delayed initiation until a later point in time*	*Attempted to stop smoking by reducing cigarette consumption first, delaying initiation until a later point in time*

Table 2: Descriptive statistics for sociodemographic and smoking and quitting behaviour characteristics

Sociodemographic characteristics	
Age, Mean (SD)	46.0 (15.96)
Age, % (n)	
16-24	11.1 (225)
25-34	15.6 (315)
35-44	20.6 (415)
45-54	20.6 (415)
55-64	17.8 (360)
65+	14.3 (288)
Sex, % female (n)	54.5 (1100)
Social grade, % (n)	
AB	12.9 (260)
C1	23.0 (465)
C2	21.7 (438)
D	17.3 (349)
E	25.1 (506)
Smoking and quitting behaviour characteristics	
Spontaneous quit attempt, % (n)	49.0 (988)
Quit attempt made without cutting down first, % (n)	48.9 (986)
Time since start of most recent quit attempt, % (n)	
Last week	8.6 (174)
Between a week and a month	20.4 (412)
One to two months	20.5 (413)
Two to three months	19.1 (386)
Three to six months	31.4 (633)
Number of quit attempts in past 6 months, % (n)	
One	69.5 (1403)
Two	21.3 (429)
Three or more	9.2 (186)
Strength of urges, % (n)	
None	7.6 (154)
Slight	13.5 (272)
Moderate	46.8 (944)
Strong	23.2 (468)
Very strong	6.7 (135)
Extremely strong	2.2 (45)
Daily cigarette consumption, Mean (SD)	13.1 (8.89)
Use of evidence-based aids during quit attempt, % yes (n)	58.4 (1178)

Table 3: Unadjusted and adjusted association between quit success and spontaneous quit attempts and other potential confounders

	Quit success, % (n)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value	BF_HN
Spontaneous quit attempt						
No* (n=1030)	22.7 (234)					
Yes (n=988)	27.7 (274)	1.31 (1.07, 1.60)	.010	1.19 (0.95, 1.49)	.121	0.94[b]
Quit attempt made without cutting down first						
No* (n=1032)	14.9 (154)					
Yes (n=986)	35.9 (354)	3.19 (2.58, 3.97)	<.001	3.08 (2.46, 3.88)	<.001	>10,000[c]
Time since start of most recent quit attempt						
Last week* (n=174)	21.8 (38)					
Between a week and a month (n=412)	22.3 (92)	1.03 (0.67, 1.59)	.896	0.80 (0.51, 1.28)	.352	0.78[b]
One to two months (n=413)	21.1 (87)	0.96 (0.62, 1.48)	.834	0.68 (0.43, 1.08)	.100	2.18[b]
Two to three months (n=386)	23.1 (89)	1.07 (0.70, 1.66)	.750	0.68 (0.43, 1.09)	.105	2.00[b]
Three to six months (n=633)	31.9 (202)	1.68 (1.14, 2.52)	.011	0.93 (0.60, 1.44)	.727	0.39[b]
Number of quit attempts in past 6 months						
One* (n=1403)	29.9 (420)					
Two (n=429)	15.6 (67)	0.43 (0.32, 0.57)	<.001	0.45 (0.33, 0.62)	<.001	>10,000[c]
Three or more (n=186)	11.3 (21)	0.30 (0.18, 0.47)	<.001	0.32 (0.19, 0.51)	<.001	6,678[c]
Strength of urges						
None* (n=154)	30.5 (47)					
Slight (n=272)	36.8 (100)	1.32 (0.87, 2.03)	.193	1.27 (0.81, 2.01)	.306	0.86[b]
Moderate (n=944)	24.6 (232)	0.74 (0.51, 1.09)	.117	0.80 (0.54, 1.21)	.290	0.81[b]
Strong (n=468)	19.4 (91)	0.55 (0.36, 0.83)	.004	0.59 (0.37, 0.93)	.022	5.68[c]
Very strong (n=135)	20.7 (28)	0.60 (0.34, 1.02)	.060	0.71 (0.39, 1.28)	.257	1.16[b]
Extremely strong (n=45)	22.2 (10)	0.65 (0.28, 1.38)	.281	0.88 (0.36, 2.04)	.777	0.66[b]
Daily cigarette consumption	n/a	0.79 (0.70, 0.88)	<.001	0.82 (0.71, 0.93)	.003	11.44[c]
Use of evidence-based aids during quit attempt						
Yes* (n=1178)	25.1 (296)					
No (n-840)	25.2 (212)	1.01 (0.82, 1.23)	.955	0.82 (0.65, 1.03)	.085	1.25[b]
Age						
16-24* (n=225)	23.6 (53)					
25-34 (n=315)	28.6 (90)	1.30 (0.88, 1.93)	.193	1.37 (0.90, 2.10)	.151	1.36[b]
35-44 (n=415)	24.3 (101)	1.04 (0.72, 1.53)	.825	1.17 (0.77, 1.78)	.460	0.58[b]
45-54 (n=415)	27.5 (114)	1.23 (0.85, 1.80)	.282	1.35 (0.90, 2.06)	.153	1.35[b]
55-64 (n=360)	25.0 (90)	1.08 (0.73, 1.60)	.693	1.37 (0.90, 2.11)	.147	1.36[b]
65+ (n=288)	20.8 (60)	0.85 (0.56, 1.30)	.461	0.98 (0.62, 1.55)	.923	0.34[b]
Sex						
Female* (n=1100)	23.0 (253)					
Male (n=918)	27.8 (255)	1.29 (1.05, 1.58)	.014	1.44 (1.16, 1.80)	.001	58.35[c]
Social grade						
AB* (n=260)	30.0 (78)					
C1 (n=465)	31.8 (148)	1.09 (0.79, 1.52)	.610	1.10 (0.77, 1.57)	.615	0.41[b]
C2 (n=438)	25.8 (113)	0.81 (0.58, 1.14)	.229	0.92 (0.64, 1.33)	.650	0.38[b]
D (n=349)	23.5 (82)	0.72 (0.50, 1.03)	.072	0.84 (0.57, 1.24)	.384	0.61[b]
E (n=506)	17.2 (87)	0.48 (0.34, 0.69)	<.001	0.65 (0.45, 0.96)	.030	5.65[c]
Survey year		1.14 (1.04, 1.26)	.008	1.08 (0.96, 1.20)	.191	0.38[b]
Survey month (continuous)		1.10 (0.99, 1.22)	.068	1.14 (1.02, 1.27)	.020	1.75[b]

* reference level

[a] evidence for the null hypothesis; [b] data are insensitive to detect an effect; [c] evidence for the alternative hypothesis

Table 4: Adjusted models between quit success and spontaneous quit attempts and potential confounder

	Adjusted OR (95% CI)	p-value	BF(HN)
Model 1			
Spontaneous quit attempt (not spontaneous*)	1.18 (0.96, 1.46)	.113	0.94[b]
Quit attempt made without cutting down first (with cutting down first*)	3.15 (2.54, 3.91)	<.001	>10,000[c]
Model 2			
Spontaneous quit attempt (not spontaneous*)	1.28 (1.04, 1.57)	.017	3.86[c]
Strength of urges			
None* (n=154)			
Slight (n=272)	1.32 (0.87, 2.02)	.199	1.18[b]
Moderate (n=944)	0.75 (0.52, 1.09)	.127	1.46[b]
Strong (n=468)	0.55 (0.37, 0.84)	.005	24.33[c]
Very strong (n=135)	0.62 (0.36, 1.05)	.079	2.73[b]
Extremely strong (n=45)	0.66 (0.29, 1.41)	.302	1.24[b]
Model 3			
Spontaneous quit attempt (not spontaneous*)	1.25 (1.02, 1.54)	.029	2.16[b]
Daily cigarette consumption	0.80 (0.71, 0.89)	<.001	136.82[c]
Model 4			
Spontaneous quit attempt (not spontaneous*)	1.36 (1.11, 1.67)	.003	31.70[c]
Social grade			
AB* (n=260)			
C1 (n=465)	1.10 (0.79, 1.54)	.561	0.40[b]
C2 (n=438)	0.81 (0.57, 1.14)	.216	0.83[b]
D (n=349)	0.71 (0.49, 1.02)	.064	2.25[b]
E (n=506)	0.48 (0.33, 0.68)	<.001	1114.57[c]

* reference level

[a] evidence for the null hypothesis; [b] data are insensitive to detect an effect; [c] evidence for the alternative hypothesis