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What characterises smokers who quit without using help? A study of users and non-users of cessation support among successful ex-smokers

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ABSTRACT

Background A variety of smoking cessation aids are available; however, the majority of smokers quit unaided. We know little of the differences between users and non-users of cessation support.

Methods A cross-sectional study based on the Danish Health Examination Survey (DANHES) conducted in 2007–2008. In all, 6445 persons reporting quitting successfully within the last 5 years were included in analyses. Users and non-users of cessation aid (medical or behavioural support) were compared with regards to age, education, years smoked, tobacco amount, tobacco type and smoking-related disease using logistic regression analysis.

Results Quitting unaided was reported by 63%. Adjusted analyses showed that men were more likely to quit unaided than women, and younger compared with older were more likely to quit unaided (eg, OR among women age 45–59 versus age 14–29 were 0.18, 95% CI 0.12 to 0.20). Additionally, those who had smoked for 15 years or more also had lower odds of quitting unaided. Smoking 15 or more grams of tobacco daily was inversely associated with quitting unaided (eg, OR among men were 0.38, 95% CI 0.31 to 0.46).

Conclusions Quitting smoking without the use of formalised aid was the most common cessation approach. Quitting unaided was more likely among men, younger age groups, those with a shorter history of smoking and those who were light smokers. These results indicate that awareness of unaided cessation in general and to those for whom it is especially relevant should be increased. This could lead to a more efficient use of resources for cessation support.

INTRODUCTION

Since the early 1970s, there has been a major focus on smoking cessation interventions, and a line of formalised cessation aids have been developed. In the same period, smoking prevalence has declined in most Western countries,[1 2] Nevertheless, as many as 30% are still smoking daily in Europe,[3] and smoking continues to be the single largest preventable cause of death.[4]

Smoking cessation reduces the risk of disease dramatically and benefits all age groups.[5] Thoughts about quitting are common among smokers and quit attempts are prevalent.[6] In Denmark, 70% of smokers report that they wish to quit.[7]

Formalised cessation aids such as medications and behavioural support have been shown to be effective in randomised controlled smoking cessation studies.[8] Not using formalised cessation aid is often considered problematic, and initiating use of aid is regarded as mandatory in order to increase cessation rate.[9 10] However, more than 60% of successful ex-smokers report no use of formalised cessation aid when quitting.[11 12] Additionally, recent studies have challenged the overall impact of formalised smoking cessation.[13] For instance, Pierce *et al*[14] found that light smokers who quit unaided were 37% more likely to be successful than those who used aid. Among heavier smokers, the success rate among those who quit unaided was 50% higher than those who used help. In response to this, it has been emphasised that the most common way of cessation in the population—quitting cold turkey or reducing before quitting—has been overlooked in the discussion on how to help smokers to quit.[15]

When focusing on unaided cessation, it is of interest to investigate what characterises those who quit without using formalised help—information that may be helpful when targeting cessation advice. It has been argued that smokers using formalised support differ from smokers who quit unaided. For instance, Fiore *et al*[16] found that women, middle-aged persons, more educated persons, persons who had made more quit attempts and particularly heavier smokers were most likely to use a cessation programme. Zhu *et al*[17] found that heavy smokers, women and older persons were more likely to use assistance.

In this study, we studied successful ex-smokers drawn from a large national health survey. The aim was to investigate whether ex-smokers who did not use formalised help differed from the group who used help in the form of either medical or behavioural cessation support.

METHODS

The study population was based on the Danish Health Examination Survey (DANHES), which was conducted in 13 municipalities in Denmark in 2007 and 2008. In each municipality, all citizens aged 18 or more were invited to participate. In all, 538 163 persons were invited to the DANHES study, and 76 484 persons participated (15%). The DANHES is described in detail elsewhere.[18] Figure 1 provides a flowchart for the inclusion in the present study. Out of the 76 484 participants in DANHES, 24 931 reported quitting smoking in their lifetime, and 6445 reported quitting within the last 5 years prior to the survey and also answered the question on methods used for cessation.

Measurements

Ex-smoking

Successful ex-smokers were defined as non-smokers, who reported that they had been daily

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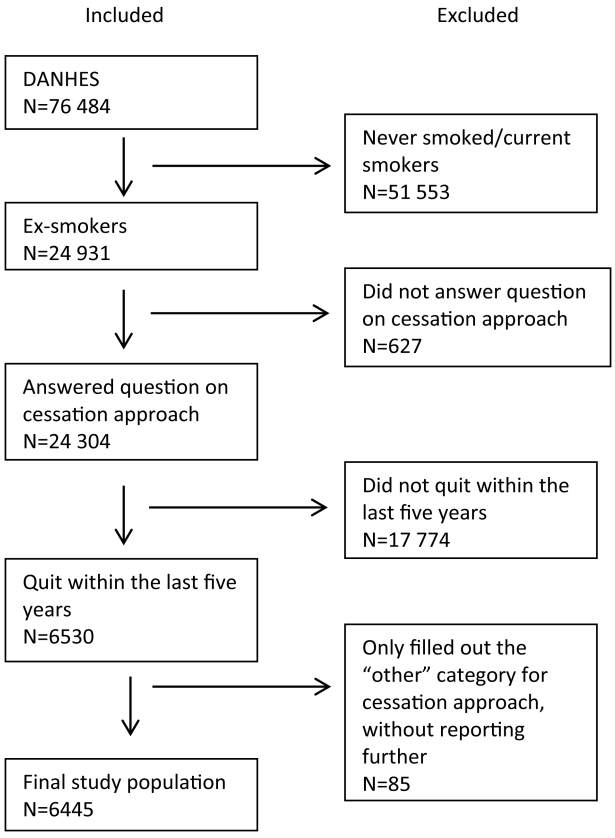

Figure 1 Flowchart of inclusion.

smokers earlier in life. Inclusion was restricted to those who had quit smoking within the last 5 years.

Aided and unaided smoking cessation

The participants were asked, "What did you do, in order to quit smoking?", with the following options, allowing for more than one answer: (1) 'I just quit', (2) "Used nicotine gum or other nicotine products", (3) "Participated in a smoking cessation course", (4) "Sought help from a doctor or other health personnel", (5) "Sought help from alternative treatment", (6) "Ate/drank instead of smoking", (7) "Sought support from family and friends" and (8) "Other" (open category). We defined aided smoking cessation as those who responded 2–5 (medical or behavioural support). Unaided smoking cessation was defined as those reporting 1, 6 or 7 (no formalised help), without also reporting 2–5. Thus, if respondents had reported both unaided and aided smoking cessation, they were grouped in aided cessation (10.6%). In those cases where respondents had used the 'other' category, the answer was grouped to fit in one of the two main groups. For instance, persons reporting 'using physical activity' were grouped 'unaided', while persons reporting using other medical products like Champix were grouped 'aided'. Those who were grouped in unaided cessation based on the categories 1–8 were regrouped as aided if they reported an answer in the 'other' category, which indicated using medical or behavioural support.

Comparison variables

Information on the following comparison variables was obtained from the DANHES, except from information on smoking-related disease, which was collected from the Danish Hospital Discharge Register. The comparison variables were selected on the basis of existing literature and availability in the study material. We compared the ex-smokers who quit aided and unaided with regards to 'education' (years of education at the time of the survey, <10 years, 10–14 years and ≥15 years), 'age at time of cessation', 'years smoked' (<15 years, 15–<30 years 30+ years), 'tobacco amount' (less than 15 g/day, 15 or more g/day), assuming 1 g of tobacco per cigarette and 3 g per cheroot/cigar, 'tobacco type' (cigarettes, only other tobacco products (cheroots, cigars, pipe tobacco)) and 'smoking-related disease' (defined as respiratory disease, coronary disease or cancer in the respiratory system in the period from 3 years prior to cessation).

Statistical analysis

First, bivariate analyses were conducted determining associations between individual characteristics and status of cessation assistance among the 6445 eligible ex-smokers from the DANHES using the χ^2 statistic in contingency tables analysis and the F-statistic in analysis of variance (table 1). Then logistic regression analyses were performed, estimating the OR of being non-users of cessation support, depending on each of the individual characteristics (table 2). The logistic regression analyses were adjusted for age at cessation and education. Finally, two sensitivity analyses were done: one analysis in order to test whether definitions of aided and unaided smoking cessation influenced the findings, by conducting logistic regression analyses where only those reporting using 'nicotine gum or other nicotine products' or 'participated in a smoking cessation course' were included in the aided category, and only those reporting 'I just quit' were included in the unaided category. And another analysis in order to test whether bias due to varying time at risk of relapse influenced the results, assessed by stratifying the main analyses according to years since cessation (quit less than 2 years ago vs quit 2–5 years ago). Participants with missing data on the comparison variables were excluded from the relevant analyses. In order to minimise the influence of potential non-participation bias, we applied weights derived from comparisons of participants and non-participants based on register-based information from Statistics Denmark on sex, age, geography, educational level, income and civil status for all individuals who were invited to participate in DANHES. The weights were included in all logistic regression analyses (tables 2–4). Analyses were performed separately for men and women, and were conducted using STATA V.12.

RESULTS

Mean age of the study population was 48 years (18–96 years), and 58.9% were women. Figure 2 shows the distribution of the respondent's answers to the question, "What did you do, in order to quit smoking?". For example, "I just quit" was reported by 67% of the men and 60% of the women, "Used nicotine gum or other nicotine products" by 22% of the men and 24% of the women and "Participated in a smoking cessation course" by 8% of the men and 10% of the women (figure 2). After grouping the answers in unaided and aided cessation, quitting unaided was in all reported by 63% of the participants; 66% (n=1755) among the men and 60% (n=2278) among the women (p<0.001).

In bivariate analyses determining associations between individual characteristics and status of cessation assistance, we found that among both men and women, ex-smokers who quit unaided were younger at the time of quitting, had smoked for a shorter period of time and had smoked less tobacco per day

Table 1 Characteristics of the study population according to smoking cessation assistance

	Men (n=2650)			Women (n=3795)		
N=6445	No assistance	Assistance	p Value	No assistance	Assistance	p Value
In all [% (n)]	66.2 (1755)	33.8 (895)		60.0 (2278)	40.0 (1517)	
Education [%]			0.81			0.019
<10 years	8.9 (143)	8.5 (71)		8.2 (174)	10.5 (149)	
10–14 years	50.5 (814)	49.5 (411)		45.2 (959)	46.8 (667)	
15+ years	40.7 (656)	42.0 (349)		46.6 (988)	42.8 (610)	
Age at time of cessation [mean (range)] (n)	48 (14–89) (1755)	49 (18–82) (895)	0.012	41 (15–91) (2278)	47 (17–83) (1517)	<0.001
Years smoked (g/day) [mean (10–90 percentiles)] (n)	27 (5–50) (1717)	31 (15–47) (883)	<0.001	20 (3–40) (2200)	28 (12–43) (1485)	<0.001
Tobacco amount [mean (10–90 percentiles)] (n)	16 (5–30) (1755)	21 (10–33) (855)	<0.001	12 (4–20) (2278)	17 (10–25) (1517)	<0.001
Tobacco type [%]			<0.001			0.55
Cigarettes	79.8 (1396)	88.2 (788)		97.6 (2217)	97.9 (1477)	
Other tobacco products	20.2 (353)	11.8 (105)		2.4 (55)	2.1 (32)	
Smoking-related disease* [%]			0.74			0.005
No	81.8 (1436)	82.4 (737)		88.9 (2024)	85.8 (1301)	
Yes	18.2 (319)	17.7 (158)		11.2 (254)	14.2 (216)	

*Defined as respiratory disease, coronary disease or cancer in the respiratory system in the period from 3 years prior to cessation.

than ex-smokers that quit using aid (table 1). In addition, we found that among men, ex-smokers who quit unaided had smoked more tobacco products (cheroots, cigars or pipe tobacco) other than cigarettes compared with ex-smokers who quit with aid. Among women, more ex-smokers who quit unaided had a smoking related disease, and had 10 or more years of education, compared with ex-smokers who quit using aided cessation.

Table 2 ORs for quitting smoking unaided, by education, age at time of cessation, years smoked, tobacco amount, tobacco type and smoking-related disease status

	Men (n=2650) OR (95% CI)	Women (n=3795) OR (95% CI)
Education (years)	0.83*	0.92*
<10	1	1
10–14	1.03 (0.79 to 1.35)	0.99 (0.78 to 1.26)
15+	1.04 (0.78 to 1.37)	0.99 (0.76 to 1.28)
Age at time of cessation (years)	<0.001*	<0.001*
14–29	1	1
30–44	0.25 (0.17 to 0.33)	0.22 (0.17 to 0.28)
45–59	0.23 (0.17 to 0.30)	0.15 (0.12 to 0.20)
60+	0.43 (0.32 to 0.58)	0.24 (0.18 to 0.32)
Years smoked	<0.001*	<0.001*
>0–<15	1	1
15–<30	0.29 (0.21 to 0.39)	0.33 (0.24 to 0.44)
30+	0.24 (0.17 to 0.35)	0.21 (0.15 to 0.30)
Tobacco amount (g/day)		
>0–<15	1	1
15+	0.35 (0.29 to 0.42)	0.27 (0.22 to 0.31)
Tobacco type		
Cigarettes	1	1
Other tobacco products	2.15 (1.66 to 2.79)	1.46 (0.89 to 2.41)
Smoking-related disease†		
No	1	1
Yes	1.07 (0.86 to 1.33)	0.94 (0.76 to 1.18)

All analyses were adjusted for age at time of cessation and education (where relevant).
*p for trend.
†Defined as respiratory disease, coronary disease or cancer in the respiratory system in the period from 3 years prior to cessation.

Table 3 ORs for quitting smoking unaided, by education, age at time of cessation, years smoked, tobacco amount, tobacco type and smoking-related disease status—using more restricted categories of aided and unaided smoking cessation*

N=4794	Men (n=2076) OR (95% CI)	Women (n=2718) OR (95% CI)
Education(years)	0.12†	0.035†
<10	1	1
10–14	0.92 (0.67 to 1.27)	0.81 (0.60 to 1.10)
15+	0.83 (0.60 to 1.16)	0.71 (0.52 to 0.98)
Age at time of cessation (years)	<0.001†	<0.001†
14–29	1	1
30–44	0.24 (0.17 to 0.33)	0.25 (0.18 to 0.32)
45–59	0.22 (0.16 to 0.31)	0.18 (0.11 to 0.20)
60+	0.38 (0.27 to 0.54)	0.27 (0.19 to 0.36)
Years smoked	<0.001†	<0.001†
>0–<15	1	1
15–<30	0.31 (0.22 to 0.45)	0.33 (0.23 to 0.47)
30+	0.27 (0.18 to 0.41)	0.22 (0.15 to 0.34)
Tobacco amount (g/day)		
>0–<15	1	1
15+	0.38 (0.31 to 0.46)	0.26 (0.22 to 0.32)
Tobacco type		
Cigarettes	1	1
Other tobacco products	1.95 (1.46 to 2.61)	1.66 (0.87 to 3.17)
Smoking-related disease‡		
No	1	1
Yes	1.20 (0.93 to 1.56)	0.87 (0.66 to 1.15)

All analyses were adjusted for age at time of cessation and education (where relevant).
*Only those reporting using 'nicotine gum or other nicotine products' or 'participated in a smoking cessation course' were included in the aided category, and only those reporting 'I just quit' were included in the unaided category.
†p for trend.
‡Defined as respiratory disease, coronary disease or cancer in the respiratory system in the period from 3 years prior to cessation.

The adjusted logistic regression analyses among both men and women showed that compared with those who quit smoking at 14–29 years, those in all other age groups were less likely to quit unaided (eg, OR among women age 45–59 were 0.15, 95% CI 0.12 to 0.20) (table 2). Furthermore, those who had smoked for 15 years or more also had lower odds of having quit unaided compared with those who had smoked for less than 15 years. For example, women who had smoked for 30 years or more had an OR of 0.21 (95% CI 0.15 to 0.30) for quitting unaided compared with those who smoked for less than 15 years. Likewise was smoking 15 or more grams of tobacco per day inversely associated with quitting unaided (eg, OR among men were 0.38, 95% CI 0.31 to 0.46). Among men, smoking tobacco products other than cigarettes was positively associated with quitting unaided (OR=2.16, 95% CI 1.67 to 2.79). Test for trend were significant for age at cessation, years smoked and tobacco amount among both men and women. A further analysis showed that adjusted for age at cessation and education women were significantly less likely to quit unaided than men (OR=0.70, 95% CI 0.63 to 0.78).

Table 3 shows the results of the sensitivity analysis using more restricted definitions of aided and unaided cessation. The only notable difference was the fact that women with the longest education appeared to be less likely to quit unaided. The second sensitivity analysis assessing the influence of varying time at risk of relapse showed no notable differences in results (table 4).

DISCUSSION

In this study, we investigated characteristics of non-users of formalised smoking cessation support among successful ex-smokers. In all, 63% of successful ex-smokers reported to have quit without using support. We found that quitting unaided was more likely among men, younger age groups, those with a shorter history of smoking and those who were light smokers. In addition, quitting unaided was more common for men smoking tobacco products other than cigarettes.

Studies based on US data have reported prevalences of quitting unaided between 92% in 1986 and 64% in 2003,[11 16 19 20] suggesting a decrease over time, probably due to the increase in available cessation aids. Our finding of 63% mirrors the 2003 US finding; thus our results confirm that unaided smoking cessation is the most used approach. The finding of men being more likely than women to quit unaided was also in accordance with previous findings.[16 17] In addition, our study confirms significant differences between ex-smokers who used cessation support and those who did not. The association between younger age groups and light smoking with quitting unaided has been reported in previous studies.[11 16 17] Fiore *et al*[16] also found that short education was associated with quitting unaided. This was not confirmed in a study by Zhu *et al*[17] nor in the present study, while Hung *et al*[11] found the inverse association. It should be noted that we did not, and could not, study whether using cessation aid or not is a more effective way of quitting smoking.

The study population included people who had quit for up to 5 years. Those who quit recently may differ from those who quit years ago as those who quit recently had less time to relapse. Put differently, predictors for quitting unaided among those quitting years ago could potentially differ from those who quit recently. However, sensitivity analysis stratifying on time

Table 4 ORs for quitting smoking unaided, by education, age at time of cessation, years smoked, tobacco amount, tobacco type and smoking-related disease status—stratified on time since cessation

	Men		Women	
	Quit <2 years ago (n=1173) OR (95% CI)	Quit 2–5 years ago (n=1477) OR (95% CI)	Quit <2 years ago (n=1660) OR (95% CI)	Quit 2–5 years ago (n=2135) OR (95% CI)
Education(years)	0.67*	0.58*	0.40*	0.32*
<10	1	1	1	1
10–14	0.84 (0.56 to 1.25)	1.24 (0.86 to 1.78)	1.10 (0.77 to 1.58)	0.91 (0.65 to 1.27)
15+	0.86 (0.57 to 1.31)	1.20 (0.82 to 1.76)	1.18 (0.80 to 1.74)	0.84 (0.59 to 1.20)
Age at time of cessation (years)	0.006*	0.005*	<0.001*	<0.001*
14–29	1	1	1	1
30–44	0.26 (0.17 to 0.39)	0.24 (0.16 to 0.35)	0.26 (0.18 to 0.38)	0.18 (0.12 to 0.26)
45–59	0.22 (0.14 to 0.32)	0.24 (0.16 to 0.35)	0.15 (0.11 to 0.22)	0.15 (0.11 to 0.21)
60+	0.46 (0.29 to 0.71)	0.40 (0.26 to 0.62)	0.30 (0.20 to 0.44)	0.20 (0.14 to 0.30)
Years smoked	<0.001*	<0.001*	<0.001*	<0.001*
>0–<15	1	1	1	1
15–<30	0.31 (0.20 to 0.48)	0.25 (0.16 to 0.41)	0.33 (0.21 to 0.52)	0.32 (0.21 to 0.48)
30+	0.24 (0.15 to 0.41)	0.22 (0.13 to 0.39)	0.26 (0.15 to 0.43)	0.18 (0.11 to 0.29)
Tobacco amount (g/day)				
>0–<15	1	1	1	1
15+	0.30 (0.23 to 0.39)	0.40 (0.31 to 0.51)	0.25 (0.20 to 0.32)	0.28 (0.22 to 0.35)
Tobacco type				
Cigarettes	1	1	1	1
Other tobacco products	2.20 (1.50 to 3.23)	2.09 (1.46 to 2.98)	1.30 (0.59 to 2.92)	1.44 (0.76 to 2.71)
Smoking-related disease†				
No	1	1	1	1
Yes	0.93 (0.67 to 1.28)	1.18 (0.89 to 1.59)	0.92 (0.67 to 1.27)	0.96 (0.70 to 1.30)

All analyses were adjusted for age at time of cessation and education (where relevant).
*p for trend.
†Defined as respiratory disease, coronary disease or cancer in the respiratory system in the period from 3 years prior to cessation.

since cessation did not indicate such differences. We cannot know whether respondents answered the question on cessation support with any of their quit attempts in mind or just their last and final, which could have led to misclassification of cessation methods. However, Fiore *et al*[16] found that the method of cessation used during the last quit attempt paralleled that used during previous attempts. Furthermore, only 10.6% of the respondents reported cessation methods pertaining to both the aided and the unaided category, limiting the potential misclassification.

The large sample size of recent quitters and the inclusion of both men and women in a wide age spectrum are the main strengths of the study. A limitation, though, is the fact that participants in the DANHES do not reflect the general population.[18] However, adjusting for nonparticipation by applying statistical weights based on comparisons of sociodemographic variables of participants and non-participants only affected results minimally, indicating that bias due to selective non-participation was limited. The fact that the study population is not representative may also have affected the prevalence of quitting unaided. The

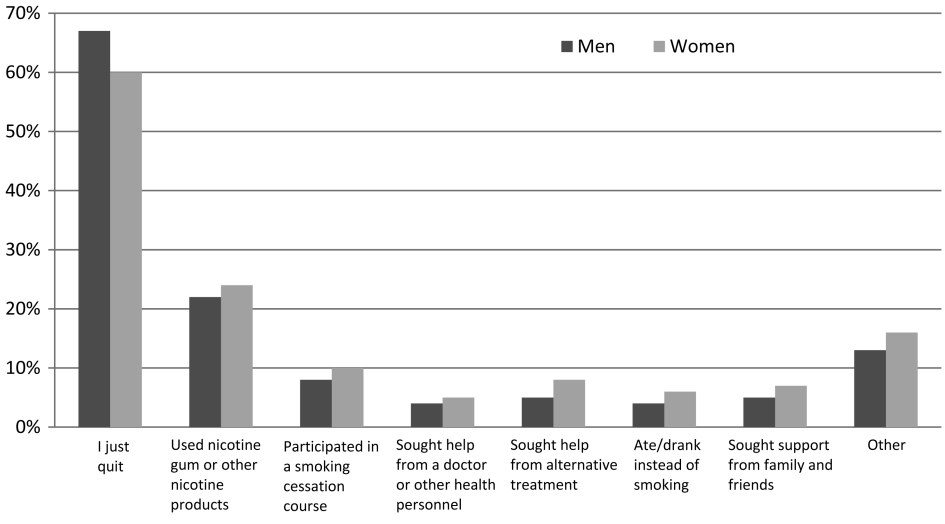

Figure 2 "What did you do, in order to quit smoking?" Summing to more than 100% as more than one answer was allowed.

weighted prevalence of quitting unaided was 67%, thus close to the unweighted 63%, presented in this paper. The prevalence might also have been affected due to the fact that information on cessation approach relied on a retrospective recall, with the possibility that memories could have become distorted. Misclassification of educational level is possible as well as this factor could have been different at the time of cessation than at the time of answering the questionnaire. However, the results of the sensitivity analysis stratified on time since cessation did not indicate an effect of such potential bias.

Number of quit attempts as a comparison variable and motivation to quit as a confounder could have been important factors to include in the analyses; however, such information was not available.

This study may contribute to promoting the recommendations of quitting unaided and to society redressing the idea of smoking cessation to be something only done successfully with formalised aid. Chapman and Mackenzie[15] suggested negative consequences of all smokers being imbued with the message that serious cessation efforts require treatment or professional aid in some way: increasing healthcare expenditure can follow, and perhaps of greater concern, smokers might become disempowered and inhibited in their quit attempts, preventing some from even trying. As the majority of ex-smokers quit without cessation aid, it is a potentially large number of smokers who might be discouraged from trying to quit, and thus a potentially large number we might encourage by promoting unaided cessation. Pierce *et al*[14] comment on the levelling off of successful cessation in recent years in the USA and the stabilisation of smoking prevalence in England. As they state, this has occurred even though the proportion of the population making quit attempts has increased and the proportion using recommended assistance to quit has more than doubled. Pierce *et al* propose a relevant explanation as to why public health initiatives have not been more effective; that heavy advertising for pharmaceutical aids may be far from optimal, even reducing smokers' willingness to persevere with a quit attempt. In light of these debates, the finding of smoking cessation without formalised cessation aid being the most widely used approach to quitting in ex-smokers is highlighting the opportunity for presenting this empowering message to smokers who are ready to quit.

The profiles of non-users and users of formalised aid may have implications for targeted promotion of cessation services and products. Resources for professional cessation aid are not unlimited, and it might be of relevance to differentiate the promotion of services and products to different types of smokers. As our results suggest, quitting unaided may be especially relevant to promote for men, for younger age groups, for those who smoked for a lesser period of time and for the light smokers. Conversely, the use of professional cessation aid might be especially relevant to promote for, for example, heavier smokers and those with a long smoking history—the group at highest risk of the dose-dependent morbidity and mortality associated with smoking.

All in all, it could be speculated that focusing more on promoting unaided cessation in general and advising it specifically for whom it is especially relevant may lead to more quit attempts in general and to resources for cessation support being used more efficiently. Unaided cessation is the most widely used approach to quit smoking, a fact that warrants more focus on and further research into this aspect of smoking cessation due to the large reaching potential on a population level.

What this paper adds

- The majority of ex-smokers quit without using formalised smoking cessation aid, such as medical or behavioural support.
- We characterise smokers who quit without using formalised cessation aid.
- Quitting unaided was more likely among men, younger age groups, those who had a shorter history of smoking and those who were light smokers.
- We believe our paper contributes to a focus on promoting unaided cessation in general and to those for whom it is especially relevant.

Contributors SSM contributed to the conception and design of the study and interpretation of data, and conducted the statistical analyses. SSM and PD drafted the manuscript. PD, LS-E and JST contributed to the conception and design of the study, interpretation of data and to critically revising the paper for submission.

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What characterises smokers who quit without using help? A study of users and non-users of cessation support among successful ex-smokers

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