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# Effectiveness of a mobile, drop-in stop smoking service in reaching and supporting disadvantaged UK smokers to quit

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## ABSTRACT

**Background** In countries where there are large disparities in smoking with persistent high rates among disadvantaged groups, there is a need to ensure that stop smoking services (SSS) reach such smokers. The primary aim of this study was to evaluate the effectiveness of a mobile, drop-in, community-based SSS in reaching more disadvantaged smokers, particularly those from routine and manual (RM) occupation groups, than standard services; secondary aims were to evaluate effectiveness in reaching those who had not previously accessed SSS, triggering unplanned quit behaviour, helping people quit and cost-effectiveness.

**Methods** Following a 4-week pilot period, a mobile drop-in SSS was delivered across various public locations in Nottingham City, UK for 6 months, offering behavioural and pharmacological support via one-to-one consultations with trained cessation advisors. Detailed demographic and smoking behaviour data were collected from all clients accessing the mobile SSS, and Nottingham's standard SSS for comparison.

**Results** Compared with smokers accessing the standard SSS (n=1856), mobile SSS smokers (n=811) were significantly more likely to be from the RM group (33.3% vs 27.2%, p=0.002), and to be first-time SSS users (67.8% vs 59.3%, p<0.001). Nearly 1 in 10 smokers setting a quit date through the mobile SSS had no prior quit intentions. The cost per smoker setting a quit date for the mobile SSS was only slightly higher than the standard SSS (£224 vs £202).

**Conclusions** A mobile drop-in SSS is an effective way of reaching more disadvantaged smokers from RM occupations, as well as those who have not previously accessed standard SSS and those without prior quit intentions.

to help smokers quit,<sup>8</sup> most commonly via a one-to-one model where the client attends appointments at a clinic of their choice, typically in health-related settings such as medical centres or pharmacies.<sup>9</sup> Such services are highly effective<sup>10</sup>; however, uptake is low with only 8% of smokers using them each year.<sup>11</sup> Improving uptake among disadvantaged smokers, in particular those in routine and manual (RM) occupation groups, is a government priority.<sup>12</sup>

Qualitative studies highlight that fear of being judged and a lack of knowledge about existing services may be barriers to access,<sup>13 14</sup> and that smokers value flexibility and accessibility in SSS.<sup>15</sup> With the aim of increasing access, SSS have introduced alternatives to the one-to-one appointment model, including drop-in sessions, telephone support and sessions in non-health-related settings.<sup>8</sup> Evaluation of the 'Fag-Ends' SSS in the UK city of Liverpool, which uses lay advisors and has a flexible, community-based approach,<sup>16</sup> reported that smokers found these features attractive, in particular, venues that fitted into their daily routines, and that appointments were not necessary<sup>17</sup>; further evaluation of this service (specifically the drop-in rolling group model) showed that it was successful in reaching disadvantaged smokers.<sup>18</sup> There is also good evidence that not all quit attempts are planned,<sup>19–23</sup> but service models that are compatible with spontaneous action, namely high visibility and accessibility to trigger and immediately support such attempts, are lacking. Therefore, despite some increased variation in available models, there remains a need to provide SSS in alternative and more accessible ways to try and reach those not currently accessing an SSS.

We therefore worked with Nottingham City's SSS, New Leaf, to develop and run a drop-in SSS from a mobile trailer unit located in visible public places in Nottingham City. Nottingham has a smoking prevalence higher than the national average (32% in 2010 and 28% in 2011)<sup>24</sup> and is ranked the 20th most deprived district in England (of 326).<sup>25</sup> The primary aim of the study was to evaluate the effectiveness of such a service in increasing uptake in disadvantaged smokers, in particular smokers in RM occupation groups, compared with New Leaf's standard service of one-to-one sessions run from fixed location clinics. Secondary aims were to determine the effectiveness of the service in increasing uptake in those who had not previously accessed services on offer,

## INTRODUCTION

Smoking is estimated to cause over five million deaths worldwide each year,<sup>1</sup> with a further 600 000 attributable to secondhand smoke exposure.<sup>2</sup> In the UK, 21% of adults smoke<sup>3</sup> and tobacco use is the leading risk factor for premature mortality and disability,<sup>4</sup> costing the National Health Service (NHS) an estimated £2.7–5.2 billion per year.<sup>5 6</sup> The health benefits of quitting are well established with gains in life expectancy seen even for those quitting in later life.<sup>7</sup>

Local NHS stop smoking services (SSS) were introduced in England in 1999 and use trained smoking cessation advisors to provide a combination of behavioural support and pharmacotherapy



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triggering unplanned quit behaviour, and helping people quit, as well as to determine cost-effectiveness from an NHS SSS perspective.

## METHODS

### The mobile SSS

The mobile SSS was developed to deliver smoking cessation support in the same way as New Leaf's existing standard service, but using a mobile unit placed in visible public places instead of fixed location clinics, with no appointment needed and a support worker positioned outside the unit as a first point of contact. The mobile SSS was delivered from an exhibition trailer which used New Leaf branding and had disabled access (figure 1). The service was piloted for 4 weeks in September/October 2010 to qualitatively explore smokers' views of the service, details of which are published elsewhere,<sup>26</sup> and to explore feasible locations. A variety of locations including supermarket and community centre car parks and industrial estates were piloted, and as per New Leaf's fixed location clinics, these were chosen to be in the more disadvantaged areas of Nottingham City.

The pilot was followed by a main study period of 6 months between April and October 2011. Eight locations were used for the main study (four supermarket car parks, two industrial estates and two car parks of community/leisure centres), based on throughput during the pilot in combination with ensuring sufficient variation in geographical area and type of location. Locations were visited on the same day each week for either the full 6-month duration or half the duration, with the exception of one location which was used on a single day only. Opening times varied according to the location, starting between 8:30 and 11:00, and staying open for 7.25 h daily. To increase public awareness of the service, posters/flyers were distributed to local shops, businesses and schools just prior to the service starting, and an advertising A-board was positioned near the trailer and a flag was attached to the trailer while the service was running. The service was run by three trained cessation advisors comprising a support worker who stood outside the trailer and provided the first point of contact for members of the public, and two advisors who carried out the consultations inside the trailer. The service ran on a drop-in basis, although appointments were offered for follow-up visits should the client prefer. Smokers interested in accessing the service were checked for eligibility (lived, worked or had general practitioner (GP) in Nottingham city) by the support worker; if not eligible, details of their local SSS were provided.

### Consultations

One-to-one consultations with a trained smoking cessation advisor took place inside the trailer and followed New Leaf's standard smoking cessation protocols that fit within the UK government guidelines for delivering local SSS.<sup>8</sup> In brief, this involves the advisor registering the client and recording demographic data, and then carrying out an assessment of their smoking behaviour including a carbon monoxide (CO) reading; the client being encouraged to make a quit attempt either that day ('immediate') or by setting a quit date ('delayed'), with a combination of behavioural and pharmacological support (pharmacotherapy chosen according to patient choice and advisor guidance); the client then being encouraged to return for weekly or fortnightly follow-up sessions to obtain further support and pharmacotherapy and have their CO measured, for a period of up to approximately 12 weeks (defined as an

'episode' of treatment), with quit status assessed at 4 weeks (self-reported and CO validated) and where possible at 52 weeks.

As part of the New Leaf service (mobile and standard), nicotine replacement therapy (NRT) was provided at the time of the consultation (if chosen type was not stocked, a voucher was supplied for exchange at a pharmacy), at no cost for those who did not pay for prescriptions. For clients opting for varenicline or bupropion, supply was arranged by sending a prescription request to the client's GP. Mobile SSS clients were also asked by the advisor about their prior quit intentions by choosing one of the following three statements (shown on a card and read out): "When I woke up this morning, I was planning on quitting or setting a quit date TODAY, or I was planning on quitting or setting a quit date in the near future but not today, or I was NOT planning on quitting or setting a quit date today or in the near future." If clients found it inconvenient to return to the mobile SSS for follow-up support, they were offered a transfer to an alternative New Leaf clinic or to telephone support. At least three attempts were made by telephone to follow-up non-attenders. All data collected during the episode were entered onto a secure database (Quit manager) as per the standard New Leaf service.

### Data analysis

All analyses were carried out in Stata V.12 (Stata Corp LP, USA). Anonymised data on episodes registered through the mobile SSS were extracted from the Quit manager database, along with all episodes registered with New Leaf's standard service defined as one-to-one fixed location clinics (the majority of which ran on an appointment-only basis, but a small number (<14%) saw clients with no appointment; pharmacy, telephone and specialist services such as pregnancy and prison services were excluded as they followed different procedures) over the same time period. The rate of uptake of episodes per advisor hour was computed by dividing the number of episodes by the total advisor hours over the study period, and the statistical significance of observed differences between mobile and standard SSS was assessed using Poisson regression.

For comparisons of mobile and standard SSS clients, information recorded during the first episode was used if a client had more than one episode recorded during the study period. The primary outcome variable was RM group, derived from the advisor coding the client's current job, or the most recent job if unemployed but worked in the past year, using standard Department of Health definitions.<sup>8</sup> The distribution of this variable was then compared between the two groups of clients using a  $\chi^2$  test. This comparison was then repeated for each of the following secondary outcome variables: gender, age group, ethnic group, pregnancy status, previous New Leaf registration, free prescription status, MOSAIC group (Mosaic public sector 2009, Experian Ltd, UK) and Index of Multiple Deprivation (IMD 2010) group.<sup>25</sup> Both MOSAIC and IMD scores are measures of social deprivation and were obtained by linking to the client's home location (postcode and super output area, respectively). If clients had missing data for the outcome variable under consideration, they were excluded from that particular analysis. Similar analyses were carried out on a number of variables relating to the quit attempt: whether set quit date, medication used, number of visits and contacts, 4-week abstinence (self-reported and CO validated) and 52-week self-reported quit status. In mobile SSS clients only, responses to the planning question were described by computing the percentage responding to each category. To determine whether any differences in the 4-week abstinence outcomes were explained by client characteristic

**Figure 1** The mobile stop smoking service.



differences between the two services, multiple logistic regression was performed and adjusted ORs for mobile versus standard SSS compared with unadjusted ORs. Abstinence percentages were also computed for the target group of smokers from the RM occupation group.

#### Cost-effectiveness analysis

The total cost of running the mobile SSS over 6 months was computed by totalling the costs for the trailer rental, staff salaries, all pharmacotherapy given or requested, equipment (depreciation factor), consumables and overheads. The total cost was then divided by the number of clients who set a quit date and by the number of 4-week quitters to obtain two measures of cost-effectiveness: the cost per person setting a quit date and the cost per quitter. For comparison, the same measures were also computed for the standard SSS. The incremental cost per quitter was calculated by dividing the difference in the cost of the two services by the difference in the number of quitters.

#### Ethical approval

A favourable opinion was given by Leicestershire, Northamptonshire & Rutland Research Ethics Committee 2 (ref: 10/H0402/35) and NHS organisational approval was obtained from NHS Nottinghamshire County.

## RESULTS

#### Service uptake

Over the 6-month study period, 856 episodes of treatment were recorded through the mobile SSS, and 2019 through standard SSS. The rate of uptake for the mobile SSS did not differ from that for the standard SSS (0.50 episode registrations/advisor hour vs 0.54, respectively; rate ratio 0.93, 95% CI 0.86 to 1.01;  $p=0.10$ ). Rates did, however, vary between the mobile unit locations with the busiest location (supermarket car park) experiencing a rate of uptake of 0.89 episode registrations/advisor hour, and the quietest (industrial estate) a rate of 0.14. There was no evidence that the rate of uptake in the standard service dropped during the time the mobile service was running, as it was similar and not statistically significantly different to

that seen during the same period 1 year previously (0.52) and during the 6-week period prior to mobile SSS starting (0.57).

#### Characteristics of clients

The 856 episodes registered on the mobile SSS were on 811 individual clients, and the 2019 episodes through the standard SSS on 1856. A comparison of the demographics and characteristics of the two groups of clients is shown in [table 1](#). Mobile SSS clients were more likely to be from RM occupations (33.3%) than standard SSS clients (27.2%), and this difference was highly statistically significant ( $p<0.002$ ). Mobile clients were also on average slightly younger, and more likely to be White British and a first-time user of New Leaf. Statistically significant differences were also seen across the different MOSAIC groups, with mobile clients more likely to fall into groups O, K and I, which are characterised by social housing or low incomes, and less likely to fall into the young, well-educated city dwellers group G. The mean IMD score did not differ between the two groups.

#### Plans to quit among mobile SSS clients

Seventy-nine per cent (644/811) of the mobile SSS clients set a quit date (immediate or delayed), which was similar to the standard service (80%, 1497/1856,  $p=0.46$ ). Of these 644 mobile clients who set a quit date, 512 (80%) responded to the question on planning and their responses are shown in [table 2](#). Nearly 1 in 10 had no prior quit intentions when they woke on the morning of registration, and nearly half had some prior quit intentions but were not planning on taking action that day. In all planning groups, the majority chose to delay their quit date rather than making an immediate quit attempt that day, and this was most common in the 'planning action in the near future but not today' group (90.7%) and least common in the 'planning action today' group (71.1%;  $p<0.001$ ). Those with no prior quit intentions were more likely to be men, aged 40 or older, and be first-time users of New Leaf than those with some prior intentions. The planning variable was not significantly associated with RM ([table 2](#)), nor with the other socio-economic status (SES) variables IMD and MOSAIC (data not shown).



**Table 1** Characteristics of clients who registered with the mobile stop smoking service (SSS) compared with the standard SSS over the 6-month study period

Number (%) unless otherwise stated	Mobile SSS (N=811)	Standard SSS (N=1856)	p Value
Routine/manual*			
No	540 (66.7)	1324 (72.8)	0.002
Yes	269 (33.3)	494 (27.2)	
Missing	2	38	
Gender			
Male	361 (44.5)	856 (46.1)	0.44
Female	450 (55.5)	1000 (53.9)	
Age, years			
Mean (SD)	38.0 (14.3)	42.0 (15.0)	<0.001
White British			
No	101 (12.6)	332 (18.4)	<0.001
Yes	702 (87.4)	1475 (81.6)	
Missing	8	49	
Pregnant			
No	798 (98.4)	1807 (97.4)	0.10
Yes	13 (1.6)	49 (2.6)	
Pays for prescriptions			
No	623 (77.0)	1412 (77.7)	0.71
Yes	186 (23.0)	406 (22.3)	
Missing	2	38	
Previous New Leaf use			
First-time user	550 (67.8)	1101 (59.3)	<0.001
Used before	261 (32.2)	755 (40.7)	
MOSAIC group			
Families in low-rise social housing with high levels of benefit need (O)	218 (27.3)	473 (25.9)	<0.001
Residents with sufficient incomes in right-to-buy social housing (K)	180 (22.5)	314 (17.2)	
Lower income workers in urban terraces often in diverse areas (I)	137 (17.2)	227 (12.4)	
Young people renting flats in high density social housing (N)	66 (8.3)	232 (12.7)	
Owner occupiers in older-style housing in ex-industrial areas (J)	48 (6.0)	80 (4.4)	
Young, well-educated city dwellers (G)	44 (5.5)	206 (11.3)	
Elderly people reliant on state support (M)	38 (4.8)	118 (6.5)	
Other	68 (8.5)	179 (9.8)	
Missing	12	27	
Index of multiple deprivation			
Mean (SD)	39.5 (13.7)	39.7 (14.7)	0.77

\*Current or most recent job in past year classed as routine/manual occupation. Routine/manual is a primary outcome variable and all other variables are secondary outcome variables.

**Characteristics and outcomes of quit attempts**

Among clients who set a quit date, differences in quit attempt experience and outcomes were seen between the services (table 3). Compared with standard clients, mobile clients were significantly less likely to make an immediate quit attempt and use varenicline, and more likely to use NRT (bupropion was only used by one mobile client and nine standard SSS clients). Mobile clients had on average only two contacts (telephone or in person) with an advisor during the episode, compared with five for standard clients; this was similar when only ‘sessions attended’ were

**Table 2** Prior quit intentions of mobile SSS clients

Number (%)	When I woke up this morning....			p Value
	I was planning on quitting or setting a quit date TODAY	I was planning on quitting or setting a quit date in the near future but not today	I was NOT planning on quitting or setting a quit date today or in the near future	
<b>Total</b>	<b>218 (42.6)</b>	<b>247 (48.2)</b>	<b>47 (9.2)</b>	
Delayed quit	155 (71.1)	224 (90.7)	36 (76.6)	<0.001
Male	65 (29.8)	116 (47.0)	28 (59.6)	<0.001
Aged 40+ years	83 (38.1)	119 (48.2)	23 (48.9)	0.07
RM group	70 (32.1)	90 (36.6)	13 (27.7)	0.38
First-time user*	138 (63.3)	170 (68.8)	38 (80.9)	0.056
Self-reported abstinent	72 (33.0)	84 (34.0)	18 (38.3)	0.79
CO-validated abstinent	39 (17.9)	47 (19.0)	7 (14.9)	0.79

\*First time used New Leaf SSS. CO, carbon monoxide; RM, routine/manual; SSS, stop smoking service.

considered (median 2 vs 4). At the 4-week follow-up, a similar proportion of mobile and standard clients reported that they were still smoking (29.7% and 32.6%, respectively), but a much higher proportion of mobile clients status was unknown due to loss to follow-up (35.6% vs 16.5%). Treating those lost to follow-up as still smoking, the proportion self-reported to be abstinent at 4 weeks was therefore significantly lower for mobile than standard clients (34.8% vs 50.9%). A further 15.8% of mobile clients and

**Table 3** Quit attempt characteristics and outcomes for mobile SSS clients compared to standard SSS clients

Number (%) unless otherwise stated	Mobile (N=644)	Standard (N=1497)	p Value
Delayed/immediate quit			
Delayed	523 (81.2)	1148 (76.7)	0.02
Immediate	121 (18.8)	349 (23.3)	
NRT used			
No	64 (9.9)	287 (19.2)	<0.001
Yes	580 (90.1)	1210 (80.8)	
Varenicline used			
No	567 (88.0)	1209 (80.8)	<0.001
Yes	77 (12.0)	288 (19.2)	
Number of contacts with advisor			
Median (IQR)	2 (1–4)	5 (3–7)	<0.001
Number of sessions attended			
Median (IQR)	2 (1–4)	4 (2–6)	<0.001
4-week self-reported abstinence*			
Lost to FU	229 (35.6)	247 (16.5)	<0.001
Not abstinent	191 (29.7)	488 (32.6)	
Abstinent	224 (34.8)	762 (50.9)	
4-week CO-validated abstinence*			
Lost to FU	331 (51.4)	497 (33.2)	<0.001
Not abstinent	195 (30.3)	499 (33.3)	
Abstinent	118 (18.3)	501 (33.5)	

\*If assume those lost to follow-up or missing are not abstinent, comparison of abstinent versus not abstinent p values same. CO, carbon monoxide; FU, follow-up; NRT, nicotine replacement therapy; SSS, stop smoking service.

16.7% of standard clients were lost to follow-up for CO validation, and the proportion of CO-validated abstinent was also significantly lower for mobile clients (18.3% vs 33.5%). These differences were still statistically significant but reduced in magnitude when only the target group of smokers from RM occupations was considered (self-reported abstinent 40.3% for mobile vs 52.2% for standard,  $p=0.005$ ; CO-validated abstinence 24.5% vs 33.2%,  $p=0.03$ ).

When control was made for those demographic variables in table 1 associated with service type, the size of the differences in abstinence between the services only marginally reduced (self-reported 4-week abstinence unadjusted OR=0.51 (95% CI 0.42 to 0.62) and fully adjusted OR=0.53 (0.44 to 0.65); CO-validated 4-week abstinence unadjusted OR=0.45 (0.36 to 0.56) and fully adjusted OR=0.48 (0.38 to 0.61)). ORs controlled for prior planning intentions could not be computed because responses were only collected from mobile clients; however, within the mobile client group, prior planning intention was seen to be unrelated to abstinence (table 2) and hence unlikely to be a confounder.

Of the clients who were self-reported abstinent at 4 weeks, only 42% (94/224) of mobile clients and 44% (336/762) of standard clients were successfully contacted at 52 weeks post-quit date, and of these, a similar proportion reported still being abstinent (33% and 33.9%, respectively,  $p=0.86$ ).

### Cost-effectiveness

The estimated cost per smoker setting a quit date was £224 for the mobile SSS, only slightly greater than that for the standard SSS (£202). The cost per 4-week quitter was £642 for the mobile SSS compared with £396 for the standard SSS, and the incremental cost per quitter £342.

### DISCUSSION

This study shows that taking a drop-in, mobile SSS out into the community can be effective in reaching more disadvantaged smokers and smokers from RM occupations, as well as smokers who have not previously accessed local smoking cessation services, than the standard SSS in the area. The service also reached smokers without prior quit intentions, suggesting for some that the visible and accessible nature of the service triggered unplanned action to receive quit support. We found no evidence that the mobile SSS attracted clients who otherwise would have accessed the existing standard SSS. As the mobile service was reaching more 'hard to reach' smokers who had not previously accessed local SSS, the lower quit rates compared with the standard SSS were not unexpected. The cost per smoker reached (ie, setting a quit date) was comparable to that for the existing service, and the cost per quitter higher, but at under £650 per quitter, the mobile SSS was still a cost-effective intervention.

While we only ran the service in one city, the areas in which the service was located are likely to be similar to disadvantaged neighbourhoods in other large UK cities. The mobile SSS would be relatively easy to replicate and implement by others. The consultations were carried out in the same way as the comparator group of New Leaf's existing standard one-to-one service, thereby meaning the services only differed with respect to use of the mobile unit instead of fixed location clinics, the support worker as the first point of contact and the drop-in nature of consultations. The inclusion of a small number of clinics in our comparator group that were not appointment-only is unlikely to materially affect the results, and if anything, would have made our findings more conservative. The strengths of this study were the large number of clients studied and hence the high statistical power to detect differences between the

mobile and standard services, and the small percentage of missing data for the RM and other demographic variables analysed.

With the exception of the Fag-Ends service in Liverpool,<sup>16–18</sup> formal evaluations of alternative SSS delivery models in the literature are lacking. Both Fag-Ends and our mobile service were successful in attracting disadvantaged smokers and both shared the key features of flexibility and accessibility, attributes that we found from our pilot phase qualitative work to be attractive to smokers.<sup>26</sup> In addition to our primary marker of SES, RM, we also saw significant differences in MOSAIC groups between the services. As MOSAIC is a widely used SES tool based on the home postcode, it has the advantage of being less susceptible to reporting error than RM. IMD was also measured, but at a less precise level (local area rather than postcode),<sup>25</sup> which may explain why no difference in IMD was seen between the services. We were unable to reach more smokers from ethnic minorities with our mobile service, the reasons for which are not clear, but as ethnicity was not a primary outcome of this study, neighbourhoods with high proportions of ethnic minorities were not specifically targeted.

A further main theme of our pilot qualitative interviews was that seeing the mobile unit, for some smokers, triggered an unplanned quit attempt (or setting of a quit date),<sup>26</sup> something confirmed during our main study. We were not able to ask the question to clients registering through standard clinics, but as most standard clinics involve making an appointment, it can be assumed that some degree of planning had taken place. Our observation, that over half of the clients setting quit dates on the mobile SSS reported that they had not planned such action when waking that morning, is in general alignment with previous estimates of unplanned quit attempts<sup>19 20 22</sup>; direct comparisons are, however, limited as the previous studies looked at the general smoking population, at any quit attempts not just assisted quit attempts, and asked about planning intentions retrospectively rather than prior to the quit outcome as here. Also, our estimates may be subject to some bias due to 20% of eligible clients not answering the planning question. Our findings relating to planning additionally support previous observations that unplanned attempts are at least equally likely to succeed as planned ones.<sup>19 22 23</sup> It is therefore important that services that are compatible with spontaneous quitting, like mobile SSS, are further developed and made widely available.

While successful in reaching more 'hard-to-reach' smokers, the mobile SSS had less success when it came to getting clients to return for follow-up support and successful quitting. This is consistent with other studies,<sup>27 28</sup> although 4-week quit rates of 35% for self-report and 18% CO-validated were still deemed acceptable for SSS.<sup>8</sup> While smokers in both services were encouraged to return for regular support and further medication, and attempts were made to telephone clients who did not return in person, the mobile SSS advisors only managed on average two contacts per client, compared to five for the standard service. A consequence of this was that mobile SSS advisors failed to obtain a 4-week self-reported quit status on just over one-third of the clients and therefore quit status could not be established, resulting in a likely underestimation of true abstinence (non-contacts assumed to be treatment failures). Of those who did provide self-reported quit status, however, the majority could be validated with CO measurements (mobile 75% and standard 80%). It is unlikely that accessibility played a large part in the low follow-up since the mobile unit returned to the same location on the same day each week. Clients were made aware of this at registration, and the average sessions attended was no higher when the 12-week period prior to the mobile SSS finishing was excluded. It may instead be that unmeasured factors

relating to the type of clients the service attracted play a role in explaining the lower follow-up and quit success. As the data at 52-week follow-up were limited, conclusions about long-term abstinence in mobile clients are hard to draw; however, we found no evidence to suggest that the gap in abstinence between the services widened between 4 and 52 weeks.

In conclusion, a mobile, drop-in, community-based SSS is an effective way of reaching and supporting disadvantaged smokers to quit, particularly those from the priority RM group, as well as those who have not previously accessed local SSS services and those without prior quit intentions.

### What this paper adds

#### What is already known on this subject?

Local National Health Service (NHS) stop smoking services are highly effective but uptake is low, and improving uptake among disadvantaged smokers in particular is a government priority. To try and reach those not currently accessing services, alternative and more accessible stop smoking services are needed.

#### What this study adds?

This study shows that a mobile, drop-in, community-based stop smoking service positioned in visible public places is an effective way of reaching disadvantaged smokers and those who have not previously accessed local stop smoking services. Such a service also appears to be an effective way to trigger quit action in smokers without prior quit intentions.

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**Disclaimer** The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

**Data sharing statement** The data for the study were collected using Nottingham New Leaf SSS' existing database and data collection procedures and therefore are shared with them.

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### REFERENCES

- Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3:e442.
- Oberg M, Jaakkola MS, Woodward A, et al. Worldwide burden of disease from exposure to second-hand smoke: a retrospective analysis of data from 192 countries. *Lancet* 2011;377:139–46.
- Robinson S, Harris H. *Smoking and drinking among adults, 2009*. Newport: Office for National Statistics, 2011.
- Murray CJ, Richards MA, Newton JN, et al. UK health performance: findings of the Global Burden of Disease Study 2010. *Lancet* 2013;381:997–1020.
- Callum C, Boyle S, Sandford A. Estimating the cost of smoking to the NHS in England and the impact of declining prevalence. *Health Econ Policy Law* 2011;6:489–508.
- Allender S. The burden of smoking-related ill health in the UK. *Tob Control* 2009;18:262–7.
- Doll R, Peto R, Boreham J, et al. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ* 2004;328:1519–33.
- Department of Health. Local Stop Smoking Services. Service delivery and monitoring guidance 2011/12.
- Statistics on NHS Stop Smoking Services: England, April 2011–March 2012. The Health and Social Care Information Centre, 2012. <https://catalogue.ic.nhs.uk/publications/public-health/smoking/nhs-stop-smok-serv-eng-apr-2011-mar-2012/stat-stop-smok-serv-eng-apr-11-mar-12-rep.pdf> (accessed 10 Jul 2014).
- Bauld L, Bell K, McCullough L, et al. The effectiveness of NHS smoking cessation services: a systematic review. *J Public Health* 2010;32:7182.
- Lader D. Opinions Survey Report No. 40. Smoking-related Behaviour and Attitudes, 2008/09. London: Office for National Statistics, 2009. <http://www.ons.gov.uk/ons/rel/lifestyles/smoking-related-behaviour-and-attitudes/2008-09/index.html> (accessed 10 Jul 2014).
- Department of Health. Healthy Lives, Healthy People: A Tobacco Control Plan for England. 2011.
- Roddy E, Antoniak M, Britton J, et al. Barriers and motivators to gaining access to smoking cessation services amongst deprived smokers—a qualitative study. *BMC Health Serv Res* 2006;6:147.
- White M, Bush J, Kai J, et al. Quitting smoking and experience of smoking cessation interventions among UK Bangladeshi and Pakistani adults: the views of community members and health professionals. *J Epidemiol Community Health* 2006;60:405–11.
- Ritchie D, Schulz S, Bryce A. One size fits all? A process evaluation—the turn of the 'story' in smoking cessation. *Public Health* 2007;121:341–8.
- Owens C, Springett J. The Roy Castle fag ends stop smoking service: a successful client-led approach to smoking cessation. *J Smoking Cessation* 2006;1:13–18.
- Springett J, Owens C, Callaghan J. The challenge of combining lay knowledge with evidence-based practice in health promotion: Fag Ends Smoking Cessation Service. *Critical Public Health* 2007;17:243–56.
- Bauld L, Ferguson J, McEwan A, et al. Evaluation of a drop-in rolling group model of support to stop smoking. *Addiction* 2012;107:1687–95.
- West R, Sohal T. "Catastrophic" pathways to smoking cessation: findings from national survey. *BMJ* 2006;332:458–60.
- Larabie LC. To what extent do smokers plan quit attempts? *Tob Control* 2005;14:425–8.
- Ferguson SG, Shiffman S, Gitchell JG, et al. Unplanned quit attempts—results from a US sample of smokers and ex-smokers. *Nicotine Tob Res* 2009;11:827–32.
- Murray R, Lewis S, Coleman T, et al. Unplanned attempts to quit smoking: missed opportunities for health promotion. *Addiction* 2009;104:1901–9.
- Sendzik T, McDonald PW, Brown KS, et al. Planned quit attempts among Ontario smokers: impact on abstinence. *Addiction* 2011;106:2005–13.
- Nottingham City Council. Nottinghamshire Citizen's Survey 2011. 12 March 2012. <http://www.nottinghaminsight.org.uk/insight/library/citizens-survey.aspx> (accessed 10 Jul 2014).
- Department for Communities and Local Government. The English indices of deprivation 2010. 24 March 2011. <https://www.gov.uk/government/publications/english-indices-of-deprivation-2010> (accessed 10 Jul 2014).
- Bains M, Venn A, Murray RL, et al. A qualitative exploration of smokers' views regarding aspects of a community-based mobile stop smoking service in the United Kingdom. *BMC Public Health* 2011;11:873.
- McNeill A, Amos A, McEwen A, et al. Developing the evidence base for addressing inequalities and smoking in the United Kingdom. *Addiction* 2012;107(Suppl. 2): 1–7.
- Hiscock R, Murray S, Brose LS, et al. Behavioural therapy for smoking cessation: the effectiveness of different intervention types for disadvantaged and affluent smokers. *Addict Behav* 2013;38:2787–96.