

Planned quit attempts among Ontario smokers: impact on abstinence

Taryn Sendzik¹, Paul W. McDonald^{1,2}, K. Stephen Brown^{2,3}, David Hammond¹ & Roberta Ferrence^{2,4}

Department of Health Studies and Gerontology, University of Waterloo, Ontario, Canada;¹ Ontario Tobacco Research Unit, Toronto, Ontario, Canada;² Department of Statistics and Actuarial Science, University of Waterloo, Ontario, Canada;³ and Dalla Lana School of Public Health, University of Toronto, Ontario, Canada;⁴

ABSTRACT

Aims To examine the use and role of planned quit attempts by smokers and their impact on abstinence. **Design** Retrospective, using longitudinal data from the Ontario Tobacco Survey. **Setting** Ontario, Canada. **Participants** A total of 551 adult smokers who reported having made a quit attempt during 2007–08. **Measurements** Reported planning of the most recent quit attempt (i.e. unplanned or planned some time in advance), engaging in preparatory behaviours believed to be related to planning (i.e. use of quit aids such as pharmacotherapy, formal support or health professionals) and abstinence at 1 week and 1 month following the attempt. **Findings** Of the smokers, 73.6% planned their quit attempt in advance. Reported planning was more likely among those who thought they were very addicted, compared with those who were less addicted [odds ratio (OR) = 2.22, 95% confidence interval (CI): 1.15–4.28]. Smokers who planned a quit attempt were much more likely to use a quit aid (OR = 3.50, 95% CI: 1.80–6.79), particularly pharmacotherapy (OR = 6.13, 95% CI: 3.05–12.34). The odds of abstaining for 1 week were lower among those who planned (OR = 0.45, 95% CI: 0.22–0.89), independent of perceived addiction. No significant difference was observed for abstinence lasting 1 month. Other factors associated with abstinence were smoking fewer cigarettes per day and having personal support. **Conclusions** Although most quit attempts were planned and planners had higher odds of using quit aids, planning did not increase the likelihood of success.

Keywords Abstinence, behaviour, planning, quit attempts, smoking cessation, unplanned.

Correspondence to: Taryn Sendzik, Department of Health Studies and Gerontology, University of Waterloo, 200 University Avenue West, Waterloo, Ontario, Canada N2L 3G1. E-mail: tsendzik@uwaterloo.ca

Submitted 22 March 2010; initial review completed 30 June 2010; final version accepted 9 May 2011

INTRODUCTION

Planning has long been considered an important element of any successful quit smoking strategy. Theoretically, planning prepares smokers for the physiological, behavioural and psychological challenges associated with quitting and remaining abstinent and is a common component of behavioural cessation programmes [1]. Planning also plays an integral role in prevailing health behaviour change theories (e.g. Theory of Planned Behaviour [2], Precaution Adoption Process Model [3], Transtheoretical Model of Change [4], Health Action Process Approach [5]).

Although planning is putatively an integral part of behaviour change, recent cross-sectional studies indicate

that a substantial proportion of quit attempts are unplanned (i.e. made spontaneously without advance planning) and may lead to more successful cessation than those that are planned [6–9]. In a series of interviews with current and former smokers, Larabie (2005) found that many quit attempts were unplanned and ex-smokers were more likely than current smokers (67% versus 37%) to report that their most recent attempt was unplanned [6]. A recent survey of British smokers found that 49% of smokers and ex-smokers reported that their last quit attempt was unplanned, and those who did not plan had higher odds of remaining abstinent for at least 6 months than those who planned [7]. A US study found that the 30% of smokers and 52% of ex-smokers who made a recent unplanned quit attempt had twice the odds of

remaining quit at 6 months and a decreased risk (50%) of daily relapse [8]. Another British survey found that 37% of quit attempts were unplanned and the odds of 6-month quit success for unplanned quitters were two times higher than for quitters who planned [9]. Collectively, these results call into question the importance of individual planning for tobacco cessation. Given the potential impact of these findings on current cessation practices, replication and further testing of the differences between planners and spontaneous quitters is warranted.

The current study replicates previous examinations of self-reported planning of smoking cessation attempts using longitudinal data from the Ontario Tobacco Survey (OTS). This study examined: (i) the proportion of adult smokers who planned their most recent quit attempt; (ii) differences in personal attributes of those making planned quit attempts; (iii) differences in preparatory behaviours believed to be related to planning (i.e. any use of a quit aid such as pharmacotherapy, formal support or health professionals); and (iv) the impact of planning on abstinence lasting at least 1 week and at least 1 month.

METHODS

Data for the current study came from the Ontario Tobacco Survey (OTS), a telephone survey of 7500 adult smokers and non-smokers in Ontario, Canada, used to evaluate the Smoke-free Ontario Strategy. A provincially representative *longitudinal* survey of smokers was conducted from 2005 to 2010 [10–12] as part of this survey, with follow-up of respondents every 6 months. One objective of the longitudinal component was to understand more clearly the processes and influences involved in smoking cessation and relapse. Data were collected using Computer Assisted Telephone Interviewing (CATI) technology with a probability sample of smokers, stratified by geographic region and specified quotas. For each wave, 750 smokers were invited to complete a baseline survey and three follow-up surveys. Participants received approximately US\$15 for participating in each wave. All OTS recruitment and data collection procedures were reviewed and cleared by the Ethics Review Boards at the University of Toronto, the Centre for Addiction and Mental Health and the University of Waterloo.

Data for this study were collected longitudinally to determine changes in smoking behaviour and retrospectively on the most recent quit attempt to determine the characteristics of this attempt.

Sample

The sample from waves 5 and 6 of the OTS was used for this analysis. Respondents were daily and non-daily smokers who completed a 6-, 12- or 18-month follow-up

survey, reported making a quit attempt in the 6 months between survey waves, and indicated whether this quit attempt was planned or unplanned. Of the 3267 wave 5 and 6 respondents, 2429 completed a 6–18-month follow-up (AAPOR response rate 6 = 89.2%) [11–13]. Among these respondents, 551 made a quit attempt in the past 6 months and completed the question on planning.

Measures

Responses to the question 'In the past 6 months, did you try to quit smoking completely?' were used to identify who had made a quit attempt.

Quit attempt type

Planning was determined using the question: 'Which of these statements best describes how your most recent quit attempt started: I did not plan the quit attempt in advance, I just did it; I planned the quit attempt for later the same day; I planned the quit attempt the day beforehand; I planned the quit attempt a few days beforehand; I planned the quit attempt a few weeks beforehand; I planned the quit attempt a few months beforehand?'. Attempts for which individuals reported they had planned 'later the same day', 'the day beforehand', 'a few days beforehand', 'a few weeks beforehand' or 'a few months beforehand' were defined as planned, while self-reports that 'they did not plan the attempt in advance, they just did it' were defined as unplanned.

Preparatory behaviour—use of quit aids

Quit aid use during a quit attempt was seen as a potential proxy measure of a developed quit plan (i.e. preparation for dealing with withdrawal, difficult situations and remaining quit). Four items—use of pharmacotherapy, health professionals, other formal support and any quit aids—were identified from the quit aid questions in the OTS. Quit aid use responses were taken from the wave in which the respondent reported making their most recent quit attempt.

Pharmacotherapy use was defined by a 'yes' response to any or all of: 'nicotine patches', 'nicotine gum or chewing pieces like Nicorette', 'a nicotine inhaler', 'Zyban or bupropion', 'Wellbutrin' and 'Champix or varenicline'.

Health professional use was defined by a 'yes' response to any or all of: did the 'dentist advise you to reduce or quit smoking', 'pharmacist advise you to reduce or quit smoking' and 'doctor advise you to reduce or quit smoking'.

Use of other formal support was defined by responding 'yes' to any or all of: 'used hypnosis, acupuncture or laser therapy', 'used a self-help booklet or video, website or

chat group', 'been to group counseling or a group support program', 'saw a specialized addiction counselor', 'called the Ontario Smoker's Helpline' and 'took part in a quit program'.

Any use of quit aids was defined by a 'yes' response to any use of pharmacotherapy, and/or health professionals, and/or formal support as identified above.

Abstinence

Responses to the questions: 'How long ago was it that you last smoked a cigarette?' and 'In the past 6 months, what was the longest amount of time you stayed smoke-free?' were used to determine the length of abstinence for an individual's most recent quit attempt. Reported time since the last cigarette was smoked was used for respondents who had quit and were not smoking at follow-up. Reported time that a respondent was able to stay smoke-free was used for respondents who reported making a quit attempt but were smoking at follow-up. Responses were dichotomized as 'yes' or 'no' if the participant successfully abstained for at least 1 week and at least 1 month.

Covariates

Demographic covariates collected included sex (male; female), year of birth and highest level of education completed (no post-secondary -> i.e. no schooling through completed secondary; some or completed post-secondary).

Smoking behaviour covariates included number of consumed cigarettes per day, age first smoked daily, self-perceived addiction (not at all or somewhat addicted to cigarettes; very addicted to cigarettes).

Quitting-related covariates included the number of serious life-time quit attempts, perceived ease of quitting (very easy, easy or somewhat hard; very hard), perceived confidence in succeeding if quit attempt made (not at all or not very confident; very or fairly confident), perceived health and other benefits gained from quitting (no, little or quite a bit of benefit; benefit a lot), having a quit support person (yes; no), having a person that might make it more difficult to quit (yes; no).

Other covariates included perceived health (excellent or very good; good, fair or poor).

Data used for covariates are based on participants' responses prior (time 1) to making their planned or unplanned quit attempt (time 2).

Data analyses

Analyses were conducted using SAS version 9.1 advanced survey procedures to account for the stratified design and complex sampling units of the OTS. OTS data were weighted by geographic region, sex, age and

smoking status using provincial population estimates from the 2006 Canadian census.

Data were reviewed for any unusual values or patterns that could affect the quality of the analyses. This review showed that 22% of cases contained at least one missing response, 25 distinct patterns of missingness—of which 17 patterns consisted of a single missing response and an arbitrary pattern of missingness (i.e. non-systematic). To minimize the effect of missing data, reduce response bias and improve statistical power, multiple imputation (MI) using Markov chain Monte Carlo (MCMC) modelling was applied to impute missing independent variables. MI was selected because of the categorical nature of many of the response measures and the fact that MI fills in missing values that more accurately reflect expected values compared with other *ad hoc* methods [14,15].

Using SAS PROC MI, five unique data sets were generated by replacing missing values with simulated values informed by existing demographic and behavioural variables and taking into account within- and between-subject variance. Smoking status was not among the imputed variables. The imputed data sets were then analysed using SAS PROC SURVEYLOGISTIC and combined using PROC MIANALYZE to derive inferences about the parameters of interest in research questions 2, 3 and 4, with standard errors accounting for the OTS sampling design and variability generated by MI. Research question 1 was analysed using the original data set and SURVEYFREQ.

RESULTS

Sample characteristics

Personal attributes of the final sample by quit type (planned or unplanned) are presented in Table 1.

Use of planning

Overall, 73.6% ($n = 413$) of respondents reported that their quit attempt was a planned quit attempt, while 26.4% ($n = 138$) reported an unplanned quit attempt (see Fig. 1).

Relationship between quit type and personal attributes

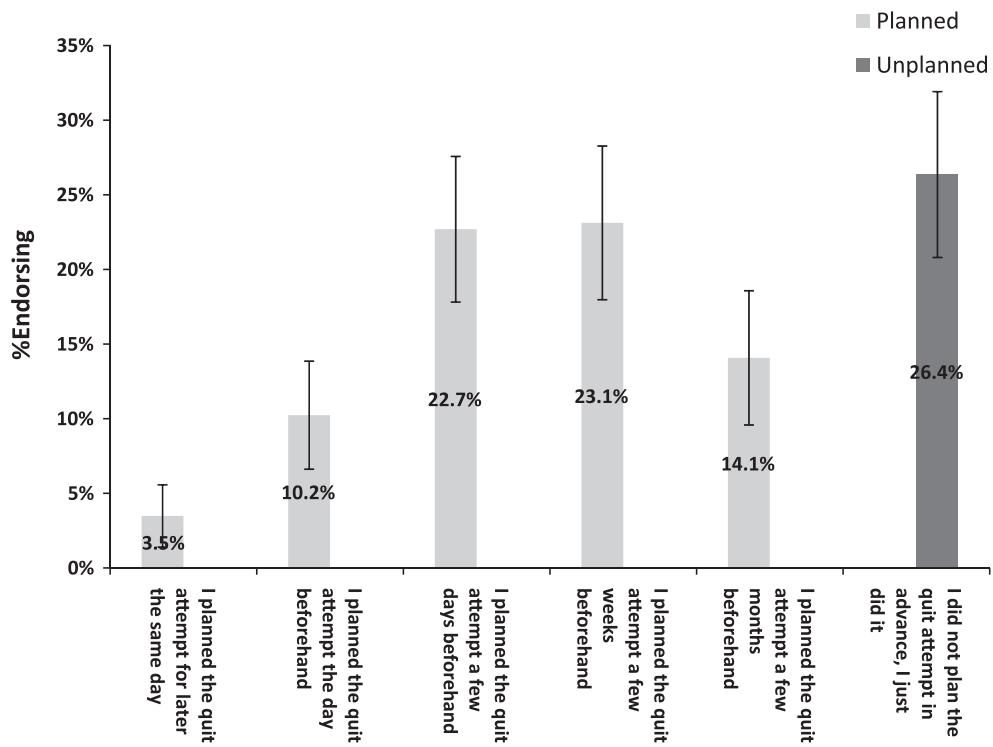
Summarized in Table 2 are the results of univariate regression models predicting quit type according to personal attributes.

Table 3 shows the multiple logistic regression model predicting planning in which each of the demographic, smoking behaviour and quitting-related factors is controlled for the other factors. The odds of planning for smokers who perceived that they were 'very addicted' was 2.22 times that of those who perceived that they were

Table 1 Demographic characteristics, smoking history and quitting beliefs by quit type.

Variable	Response option	Quit type	
		Planned	Unplanned
		n = 413	n = 138
Age (years)	Mean	40.2	41.9
	SD	14.1	15.8
Age smoked daily (years)	Mean	17.6	18.8
	SD	5.3	6.3
Cigarettes per day	Mean	13.0	11.0
	SD	4.6	8.1
No. of life-time quit attempts	Mean	5.3	4.4
	SD	9.6	11.2
Sex	Female	48.0%	35.6%
Education	No post-secondary	45.1%	50.7%
Perceived addiction	Very addicted	58.5%	33.5%
Perceived health	Very good or excellent	42.8%	55.4%
Ease of quitting	Very hard	43.3%	26.7%
Confidence in succeeding	Very or fairly confident	68.1%	65.4%
Benefit from quitting	A lot	61.5%	47.8%
Support person	Yes	90.2%	88.7%
Difficult person	Yes	53.2%	53.1%

SD: standard deviation.

**Figure 1** Weighted proportion of quit attempts by quit type. Error bars indicate the 95% confidence limits for percentages

'not' or 'somewhat addicted' to cigarettes, 95% confidence interval (CI): 1.15–4.28. After adjustment, no significant associations were found for sex, age, education, number of cigarettes consumed per day, age smoked daily,

perceived health, number of life-time quit attempts, perceived ease of quitting, confidence succeeding, perceived benefit from quitting, having a support person or having a person who might make quitting more difficult.

Table 2 Univariate regression models regressing quit type (planned versus unplanned) on demographic characteristics, smoking behaviour and quitting-related factors.

Variable model	Imputed (n = 551)		
	OR	95% CI	P
Sex	Female (R)	1.00	
	Male	1.67	0.97–2.88 0.0652
Age	Continuous	0.99	0.97–1.01 0.4972
	No post-secondary (R)	1.00	
Education	Some or completed post-secondary	1.25	0.71–2.22 0.4374
	Not at all or somewhat addicted (R)	1.00	
Perceived addiction	Very addicted	2.80	1.59–4.91 0.0003***
	Continuous	1.03	0.99–1.06 0.1264
Cigarettes per day	Continuous	0.97	0.92–1.02 0.1716
	Good, fair, or poor (R)	1.00	
Perceived health	Very good or excellent	0.61	0.34–1.08 0.0878
	Continuous	1.03	0.99–1.07 0.2000
No. of life-time quit attempts	Very easy, easy, somewhat hard (R)	1.00	
	Continuous	2.10	1.19–3.70 0.0111*
Ease of quitting	Very hard	1.00	
	Not at all or not very confident (R)	1.13	0.61–2.11 0.7051
Confidence succeeding	Very or fairly confident	1.00	
	No, little, or quite a bit of benefit (R)	1.75	0.98–3.12 0.0638
Benefit from quitting	Benefit a lot	1.00	
	No (R)	1.16	0.54–2.48 0.7056
Support person	Yes	1.00	
	No (R)	1.00	
Difficult person	Yes	1.00	0.57–1.77 0.8700

*P < 0.05; ***P < 0.001. R: reference. The odds ratios (OR) and confidence intervals (CI) provided above are derived from univariate regression models of the weighted imputed data set.

Preparatory behaviour

Among those who made a planned quit attempt, 82.6% reported using one or more quit aid during the survey period in which their most recent quit attempt was made compared to 57.6% of those who made unplanned attempts (see Fig. 2). A logistic regression analysis was conducted to determine whether quit type could predict cessation aid use. The odds of planners reporting quit aid use were 3.5 times the odds of those who made an unplanned attempt, without adjusting for other factors, OR = 3.50, 95% CI: 1.80–6.79. Examining specific quit aid use, those who planned had odds for reported pharmacotherapy use that were 6.1 times the odds of those making unplanned attempts, OR = 6.13, 98% CI: 3.05–12.34. No significant differences were observed in the odds ratios (ORs) for using other formal support or health professionals.

Relationship between quit type and abstinence

One week

Two-thirds (64.8%) of planned and 82.1% of unplanned attempts lasted at least 1 week. The results of the multiple regression modelling are summarized in Table 4. After controlling for the influence of demographic, smoking,

quitting-related and quit aid use factors, the odds of abstaining for at least 1 week for those making a planned quit attempt were less than half the odds of those who made an unplanned attempt [OR = 0.45, 95% CI: 0.22–0.89]. Those with higher odds of successfully abstaining for at least 1 week were those who smoked fewer cigarettes per day (OR = 0.95, 95% CI: 0.92–0.98) and those who reported having a support person (OR = 2.83, 95% CI: 1.35–5.94) controlling for other factors.

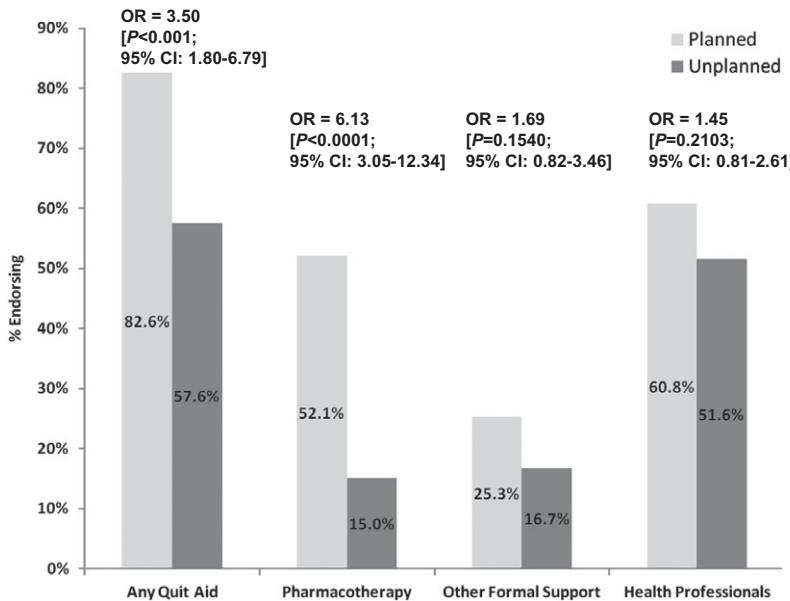
One month

More than one-third (35.7%, n = 147) of planned and half (50.6%, n = 70) of unplanned attempts lasted at least 1 month. Modelling the effect of planning on abstinence lasting at least 1 month (see Table 4, last 3 columns), adjusting for other demographic, smoking, quitting and quit aid use factors, planning was not significant (OR = 0.63, 95% CI: 0.33–1.22). The odds of succeeding for at least 1 month were more than threefold for those who had a support person compared to those without, controlling for other factors (OR = 3.10, 95% CI: 1.30–7.36). The odds of successfully abstaining for at least 1 month were lower for those who smoked more cigarettes per day, controlling for other factors (OR = 0.96, 95% CI: 0.93–1.00).

Table 3 Multiple logistic regression model regressing quit type (planned versus unplanned) on demographic characteristics, smoking behaviour and quitting-related factors.

Variable model	Imputed (<i>n</i> = 551)		
	OR	95% CI	P
Sex	Female (R)	1.00	
	Male	1.50	0.37–1.20 0.1757
Age	Continuous	0.99	0.97–1.01 0.2083
	No post-secondary (R)	1.00	
Education	Some or completed post-secondary	1.40	0.76–2.60 0.2821
	Not at all or somewhat addicted (R)	1.00	
Perceived addiction	Very addicted	2.22	1.15–4.28 0.0170*
	Continuous	1.02	0.99–1.06 0.2468
Cigarettes per day	Continuous	0.98	0.93–1.04 0.5120
	Good, fair, or poor (R)	1.00	
Perceived health	Very good or excellent	0.74	0.40–1.36 0.3304
	Continuous	1.02	0.97–1.06 0.4125
No. of life-time quit attempts	Very easy, easy, somewhat hard (R)	1.00	
	Very hard	1.20	0.59–2.47 0.6147
Confidence succeeding	Not at all or not very confident (R)	1.00	
	Very or fairly confident	1.67	0.79–3.49 0.1777
Benefit from quitting	No, little, or quite a bit of benefit (R)	1.00	
	Benefit a lot	1.45	0.74–2.84 0.2793
Support person	No (R)	1.00	
	Yes	1.38	0.59–3.23 0.4590
Difficult person	No (R)	1.00	
	Yes	0.85	0.45–1.61 0.6116

**P* < 0.05; R: reference. The odds ratios (OR) and confidence intervals (CI) provided above are derived from logistic regression models of the weighted imputed data set.

**Figure 2** Reported quit aid use by quit type; CI: confidence interval; OR: odds ratio

DISCUSSION

Results suggest that while planning was more common among smokers making a quit attempt, a notable proportion of quit attempts were unplanned. Smokers who

reported they were very addicted to cigarettes were more likely to plan. Further, those who planned had higher odds of reported quit aid use, particularly pharmacotherapy. However, odds for use of health professionals and other formal support did not differ significantly with planning.

Table 4 Multiple logistic regression models regressing 1 week and 1 month abstinence (yes versus no) on demographic characteristics, smoking behaviour, quitting-related factors and quit aid type.

Variables		1 week			1 month		
		Imputed (n = 551)			Imputed (n = 551)		
		OR	95% CI	P	OR	95% CI	P
Quit type	Unplanned (R)	1.00			1.00		
	Planned	0.45	0.22–0.89	0.0229*	0.63	0.33–1.22	0.1714
Sex	Female (R)	1.00			1.00		
	Male	1.04	0.60–1.81	0.8923	0.86	0.49–1.49	0.5862
Age	Continuous	1.02	1.00–1.04	0.1186	1.01	0.99–1.03	0.2758
Education	No post-secondary (R)	1.00			1.00		
	Some or completed post-secondary	0.79	0.45–1.38	0.4019	0.60	0.35–1.05	0.0726
Perceived addiction	Not at all or somewhat addicted (R)	1.00			1.00		
	Very addicted	0.88	0.43–1.81	0.7291	0.78	0.41–1.51	0.4682
Cigarettes per day	Continuous	0.95	0.92–0.98	0.0040**	0.96	0.93–1.00	0.0273*
Age smoked daily	Continuous	1.02	0.98–1.07	0.2833	1.02	0.97–1.07	0.4221
Perceived health	Good, fair, or poor (R)	1.00			1.00		
	Very good or excellent	0.99	0.57–1.70	0.9674	1.12	0.65–1.92	0.6861
No. of life-time quit attempts	Continuous	1.00	0.98–1.03	0.7780	0.99	0.95–1.03	0.5760
Ease of quitting	Very easy, easy, somewhat hard (R)	1.00			1.00		
	Very hard	0.71	0.36–1.43	0.3380	1.93	0.92–4.10	0.0852
Confidence succeeding	Not at all or not very confident (R)	1.00			1.00		
	Very or fairly confident	1.09	0.54–2.22	0.8078	1.37	0.70–2.68	0.3554
Benefit from quitting	No, little, or quite a bit of benefit (R)	1.00			1.00		
	Benefit a lot	0.94	0.48–1.83	0.8472	0.75	0.42–1.35	0.3359
Support person	No (R)	1.00			1.00		
	Yes	2.83	1.37–5.94	0.0060**	3.10	1.30–7.36	0.0109*
Difficult person	No (R)	1.00			1.00		
	Yes	1.34	0.73–2.46	0.3411	0.90	0.48–1.69	0.7428
Pharmacotherapy	No (R)	1.00			1.00		
	Yes	1.08	0.57–2.03	0.8153	0.87	0.48–1.57	0.6467
Other formal support	No (R)	1.00			1.00		
	Yes	1.23	0.66–2.29	0.5129	1.29	0.65–2.57	0.4603
Health Professionals	No (R)	1.00			1.00		
	Yes	0.59	0.27–1.22	0.1432	0.78	0.42–1.42	0.4091

*P < 0.05; **P < 0.01. R = reference. The odds ratios (OR) and confidence intervals (CI) provided above are derived from logistic regression models of the weighted imputed data set.

Overall, the 73.6% of adult Ontario smokers who made a recent quit attempt were found to have planned that quit attempt. The majority of smokers who planned their attempt planned at least a few days beforehand, which accords with advice from many cessation programmes and professionals. Our results are similar to previous research which found that more than 60% of current smokers planned their most recent quit attempts [6,8,9]. These estimates are higher than those from West and colleagues [7] and Kotz and colleagues [16], which estimate the proportion of planned quit attempts at 40–44%. However, this difference may be explained by the greater proportion of ex-smokers sampled in those studies.

Perceived addiction was the strongest predictor of planning when other attributes, including demographics

and smoking behaviour, were controlled. Smokers who saw themselves as very addicted had odds of planning that were 2.2 times higher than those who perceived they were less addicted. Previous research found that age [7,9], gender [9], socio-economic status [7], education, race and nicotine dependence [8] may be significant predictors of planning. Variations in these findings may be attributed to differences in samples, methods, measures, analyses performed and predictors controlled for in each analysis. Further examination of personal attributes in relation to planning may provide new intervention opportunities.

Those who planned were more likely to report quit aid use (especially pharmacotherapy), compared to those quitting without a plan. This finding is consistent with

previous studies [8,9,16], and with qualitative reports by Larabie indicating smokers' plans typically involved obtaining nicotine replacement therapy (NRT) [6]. Surprisingly, reported odds for use of health professionals or other formal support did not differ among planned and unplanned quit attempts. No difference may have been observed because advice from health professionals and other forms of formal support are relatively easy to access once a quit attempt has been made, unlike some forms of prescription-based pharmacotherapy, such as Champix or Zyban, which often require more work and advance thought. It should be noted that nicotine gum and lozenges were available over the counter in Ontario at the time of the survey. Alternatively, differences in the odds of pharmacotherapy use may have been observed because of differences in the characteristics of those making unplanned and planned attempts. The results suggest that those making planned attempts have greater odds of perceiving themselves as being very addicted, which may increase the likelihood of receiving advice to use pharmacotherapy that is accessed through licensed health professionals.

The proportion of those making an unplanned quit attempt and reporting quit aid use was actually higher than expected (57.6%). This finding differs from Murray and colleagues, who found that most unplanned quit attempts were unaided (51.7%) [9]. Differences in these findings may be due to our inclusion of advice from health professionals, which Murray and colleagues describe as a trigger to quit rather than a quit aid [9]. If advice from health professionals is defined as a quit aid, our findings raise important questions about whether unplanned attempts are truly made without planning and how researchers continue to define planning. There is a need for future research which asks how smokers themselves define a planned or unplanned attempt, what preparatory behaviours they include, and about the use and timing of quit aids to provide clarity on this issue.

Most notably, in our study, planning did not increase the odds of being abstinent for at least 1 week and 1 month. In fact, compared to planned attempts, those making unplanned attempts had higher odds of remaining abstinent for at least 1 week, although after 1 month no difference in the odds was observed regarding planning. The overall finding that planning quit attempts does not improve the odds of being abstinent is consistent with previous studies [6–9]. This contradicts health behaviour theories and clinical advice, which suggests that planning increases the odds of a successful quit attempt, and may be interpreted as evidence that either planning is not effective or that the quit plans used are insufficient to affect abstinence. However, the finding that planning does not improve the odds of abstinence should be interpreted cautiously.

This study has a number of limitations. First, the term 'plan' was not defined for participants, nor were they asked to explain what they defined as a plan during this study. Thus, it is possible that alternative definitions of planning may have been measured. For example, planning a quit attempt may refer to the simple intention of quitting in the future, or may refer to a formal set of mental actions and preparatory behaviour. Additionally, questions may be raised as to whether there is a valid difference between reported quit attempts that are unplanned, or planned for later the same day. This question about valid differences between these two scenarios may be more about the quality of the plan and less about the act. It would be useful to examine how smokers define the term 'planning' and to validate this measure.

Secondly, our analysis is based on retrospective reports of planning, quit aid use and quit attempt outcomes, which may be subject to recall error, although the time between events was reasonably short. This weakness can be applied to other studies of planning [6–9] and could be addressed using prospective research. One challenge in using measures of future planning is whether these questions are true measures of preparatory actions and behaviours which are acted upon, or simply measures of intentions.

Thirdly, it was assumed that quit aids were used specifically for the purpose of preparing to quit and abstain successfully. In some cases, quit aid use may have been unrelated to attempting to quit. Hammond and colleagues [17] found that one-third of smokers may use NRT for reasons other than quitting. Further, advice from health professionals may be unsolicited without a guarantee as to the quality of information or how it is used. It is also possible that health professional advice may serve more as a trigger for quitting rather than as a quit aid. This assumption is complicated further by the measures of quit aid use in this study which do not pinpoint whether use occurred before or after the attempt. Further research is needed which considers the reasons and timing of quit aid use.

Fourthly, it is possible that different odds of abstinence might be observed if the current respondents were followed over a longer time-period. There may be delayed effects of planning. However, this hypothesis contradicts previous findings, which indicate that those making an unplanned quit attempt are more likely to be abstinent for 6 months or more [6–9].

CONCLUSION

The current study contributes to the growing body of research regarding planning and smoking cessation. Consistent with previous findings, it shows that a majority of smokers plan their quit attempt in advance.

Further, it identifies the characteristics of individuals who make planned attempts and behaviours that predict or are more likely to be engaged in by planners. Contrary to health behaviour theories and clinical advice, planning was not found to increase the odds of abstinence. While this study provides additional insight into the relationship between planning and abstinence, it is premature to conclude that planning has no benefit and to stop recommending it to prospective quitters. Before abandoning advice to plan in favour of promoting unplanned attempts, more research is needed.

Declarations of interest

None.

Acknowledgements

Student support for the analysis and writing of this study was provided by the Ontario Tobacco Research Unit's Ashley Studentship for Research in Tobacco Control, the Canadian Institutes of Health Research Frederick Banting and Charles Best Canada Graduate Scholarship, the Canadian Institutes of Health Research Strategic Training Program in Tobacco Research Fellowship, and the University of Waterloo President's Graduate Scholarship. The authors wish to thank Charles Victor, Lori Diemert, Rashid Ahmed and Dr Roy Cameron for their assistance and support.

References

1. Fiore M. C., Bailey W. C., Cohen S. J., Dorfman S. F., Goldstein M. G., Gritz E. R. Treating tobacco use and dependence. *Clinical practice guideline*. Rockville, MD: US Department of Health and Human Services. Public Health Services; 2000.
2. Azjen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991; **50**: 179–211.
3. Weinstein N. D. The precaution adoption process. *Health Psychol* 1998; **7**: 355–86.
4. Prochaska J. O., DiClemente C. C. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol* 1983; **51**: 390–5.
5. Schwarzer R. Self-efficacy in the adoption and maintenance of health behaviors: theoretical approaches and a new model. In: Schwarzer R., editor. *Self-Efficacy: Thought Control of Action*. Washington: Hemisphere; 1992, p. 217–42.
6. Larabie L. C. To what extent do smokers plan quit attempts? *Tob Control* 2005; **14**: 425–8.
7. West R., Sohal T. 'Catastrophic' pathways to smoking cessation: findings from national survey. *BMJ* 2006; **332**: 458–60.
8. Ferguson S. G., Shiffman S., Gitchell J. G., Sembower M. A., West R. Unplanned quit attempts—results from a U.S. sample of smokers and ex-smokers. *Nicotine Tob Res* 2009; **11**: 827–32.
9. Murray R. L., Lewis S. A., Coleman T., Britton J., McNeill A. Unplanned attempts to quit smoking: missed opportunities for health promotion? *Addiction* 2009; **104**: 1901–9.
10. Bondy S., Brown K. S., Cohen J., Ferrence R., Garcia J., McDonald P. et al. Development and design of the Ontario tobacco survey. Proceedings of the Statistics Canada International Symposium Series; 2006. Ottawa, Ontario, Canada: Statistics Canada; 2006.
11. Ontario Tobacco Research Unit. *Ontario Tobacco Survey User's Guide: Wave 5 Final Report and Data*. Toronto, ON: Ontario Tobacco Research Unit; 2007.
12. Diemert L., Chatton M., Victor J. C., Bondy S. J. *Ontario Tobacco Survey Technical Report 2: Six and Twelve Month Data*. Toronto, ON: Ontario Tobacco Research Unit; 2009.
13. American Association for Public Opinion Research (AAPOR). *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, 5th edn. Lenexa, KS: AAPOR; 2008.
14. Allison P. D. *Missing Data*. Thousand Oaks, CA: Sage Publications; 2001.
15. Rubin D. B. *Multiple Imputation for Nonresponse in Surveys*. New York, NY: John Wiley & Sons, Inc; 1987.
16. Kotz D., Fidler J., West R. Factors associated with the use of aids to cessation in English smokers. *Addiction* 2009; **104**: 1401–10.
17. Hammond D., Reid J. L., Driezen P., Cummings M., Borland R., Fong G. T. et al. Smokers' use of nicotine replacement therapy for reasons other than stopping smoking: findings from the ITC four country survey. *Addiction* 2008; **103**: 1696–703.