

Does how you quit affect success? A Comparison between abrupt and gradual methods using data from the International Tobacco Control Policy Evaluation Study (ITC)

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ABSTRACT

Two recommended quit methods in standard cessation program involve either a gradual reduction of smoking prior to complete abstinence (“cut down”) or an abrupt abstinence from cigarettes (“cold turkey”). This study examined the reported use, characteristics of users and impact of self-selected strategy choice on quitting success and relapse of adult smokers who reported quitting on their own using data from the first three waves of the International Tobacco Control Policy Evaluation 4-Country Survey (ITC-4). The ITC-4 is a random digit dialed telephone survey of a cohort of over 8,000 adult smokers from UK, US, Canada, and Australia, with follow-up rate = 75%. The results indicated that 68.5% of the smokers who had made a quit attempt between waves reported using the “cold turkey” method for quitting. Of those who used the “cold turkey” method to quit, 22% and 27% succeeded at Waves 2 and 3, respectively, as compared to 12% and 16% who used the “cut down” method. Multivariate analyses revealed that “cold turkey” users were more likely to be aged 25 to 39 years, male, from UK, smoking heavily and have lower perceived dependence. Controlling for socio-demographic and known predictors of quitting including use of medications, smokers who employed the “cold turkey” method to quit were almost twice as likely to abstain for a month or more in their attempt. Overall, we cautiously conclude that “cold turkey” should be the recommended strategy for smokers who want to quit on their own.

Introduction

Smoking cessation programs can be thought to vary along three dimensions: the extent of education and behavioural training provided to the smoker; the provision of pharmacotherapy (e.g., nicotine replacement); and the type of procedure used to bring about initial cessation (Cinciripini et al., 1995). These first two factors have been the subject of many controlled studies which show that both are effective and can have an additive effect (Lancaster & Stead, 2004, 2005; Silagy, Lancaster, Stead, Mant, & Fowler, 2004), whereas research on the method used to initiate cessation has received comparably less attention and most of it some time ago (Glasgow & Lichtenstein, 1987; Viswesvaran & Schmidt, 1992).

There are two broad approaches to initiating smoking cessation: abrupt abstinence from cigarettes, sometimes called “cold turkey” and strategies which involve gradual reduction of smoking prior to complete abstinence (“cut down”). We note that the term “cold turkey” is sometimes used more specifically to denote sudden abstinence without medication. In this paper, we use the term to refer to sudden stopping regardless of use of medication. Cutting down can occur in a number of ways, either with or without medication: the most common are gradually reducing the allowed number of cigarettes per day either in a scheduled or unscheduled context, and delaying the first cigarette for longer and longer. What limited evidence we have suggests abrupt cessation is more common than cutting down (DeBernardo et al., 1999; Fiore et al., 1990; Myers & MacPherson, 2004; Stephens & Siroonian, 1998). For example, among a group of former smokers, who quit on their own, 88.4% and 25.7% reported having used abrupt and gradual cessation methods, respectively, in at least one of their quit attempts (Fiore et al., 1990).

Some smoking cessation guidelines say that “cold turkey” is better than “cut down” for initiating cessation (Action on Smoking & Health UK, 2005; American Cancer Society, 2005). Cutting down or cigarette fading has been reported as being ineffective based on an unpublished meta-analysis (Fiore et al., 2000) and thus is not recommended in the US Guidelines. However, some other guidelines introduce both methods and allow smokers to choose the method based on their personal preferences (Health Canada, 2005). Similarly, physicians and other health-care providers are typically advised to tell patients who want to quit to either gradually reduce their daily smoking frequency or to quit abruptly on a quit date (Cohen, 1994).

To date, there has only been one published meta-analysis study of interventions that compared formal use of cut down and cold turkey approaches and the results showed that on average, both sudden cessation and gradual reduction in smoking are similar in their efficacy (Law & Tang, 1995). Comparison of gradual and abrupt cessation has also been made in secondary analyses of studies that evaluated self-help manuals (Lando et al., 1991), and relapse prevention techniques (Emmons, Emont, Collins, & Weidner, 1988), but the results have been inconclusive. One more recent study on smokers who had head and neck cancer showed that relapsers were significantly more likely to quit using gradual reduction than cold turkey and less confidence in remaining abstinence during withdrawal (Gritz, Schacherer, Koehly, Nielsen, & Abemayor, 1999). However, this could be a function of the smokers who chose the technique rather than the technique itself as allocation to method was not random, but self-selected.

In a randomised controlled trial, Cinciripiri et al. (1995) were able to show that smokers assigned to a scheduled reduced smoking condition performed better than

those assigned to abrupt cessation or non-scheduled reduction condition, thus showing that mode of cutting down is important. Cinciripini and colleagues (1997) argue that scheduled reduced smoking has the following advantages over unscheduled reduction. Firstly, by controlling the timing of smoking, any associations with environmental cues that normally trigger smoking are eliminated or minimised. Secondly, scheduled reduction forces smokers to learn to employ coping strategies to overcome urges to smoke particularly during vulnerable situations, thus reducing relapse. In the unscheduled reduction method, smokers tend to cut back on those cigarettes that are easiest to give up and what remains are those that are most rewarding and are usually smoked during the most preferred times and situations. Consequently, smokers who engage in cutting down as a strategy to quit tend to relapse because of increased expectancy of reinforcement from smoking and also because they are ill-prepared to not smoke in high-risk situations (Cinciripini et al., 1997). This explanation may account for some of the disparity in findings of gradual reduction method being more inferior as compared to abrupt cessation.

Given the paucity of more contemporaneous evidence and the relatively little that we know about the patterns of use of the two quitting methods (abrupt cessation versus gradual reduction) and their potential effectiveness especially among smokers who are quitting on their own, there is value in exploring this issue further. Using data from the International Tobacco Control Policy Evaluation 4-Country (ITC-4) Survey, a cohort survey of adult smokers conducted in four countries – United States, United Kingdom, Canada and Australia, the present study aimed to examine: 1) the proportion of smokers who quit on their own who reported using each of the two quitting methods, and which smokers are most likely to use this method; 2) the quit success rate both short-term and longer term associated with each method; 3) the

characteristics of smokers who employed each particular method to successfully quit; and 4) any effect of quit method used on a previous attempt on the likelihood of the choice of method and success on an attempt in the period leading up to the next wave of the survey.

Methods

The International Tobacco Control Policy Evaluation Project (ITC) is a cohort survey conducted annually with adult smokers from Canada, the United States, the United Kingdom, and Australia. The 3 waves reported on here were conducted in October-December 2002, May-September 2003, and August-December 2004. A flowchart showing the recruitment and analytic samples at each wave is presented in Figure 1. The ITC is designed to evaluate the impact of key national-level tobacco control policies upon behavioural and psychosocial predictors of tobacco use, including previous quit history.

Sample

Data used was from smokers who had been in the cohort for at least two waves at those times, who reported smoking 5 or more cigarettes per day at the previous wave and had made a quit attempt between the focal wave and the previous wave. At wave 2, we had 2097 out of 6764 smokers from the original wave 1 cohort who were resurveyed who smoked the criterion number of cigarettes and had made a quit attempt between waves. At wave 3, we had 1864 out of 4706 smokers from the original wave 1 sample and 384 of 1121 from the wave 2 replenishment sample who met the inclusion criteria, giving a total of 2248. We also have conducted analyses on

301 of the original group who were not smoking at the Wave 2 interview, and were recontacted and interviewed for Wave 3 of the survey around one year later in 2004 to assess effects on longer term quit success or relapse. A full description of the ITC methodology, sample profile, and survey rates, including comparisons with national benchmarks, is available in Thompson et al. (2006) and even more details at <http://www.itcproject.org>.

Procedure

The ITC cohort was constructed from probability sampling methods with telephone numbers selected at random from the population of each country, within strata defined by geographic region and community size. Eligible households were identified by asking a household informant the number of adult smokers. The surveys were conducted using Computer Assisted Telephone Interviewing (CATI) software and was completed in 2 calls: a 10-minute recruitment call was followed one-week later by a 40-minute main survey. In order to increase recruitment rates, participants were mailed compensation equivalent to US\$10 prior to completing the main survey. All aspects of the interviewer training and calling protocol were standardized across the two survey firms and closely supervised by the ITC team. The study protocol was cleared for ethics by the Institutional Review Boards or Research Ethics Boards in each of the countries: the University of Waterloo (Canada), Roswell Park Cancer Institute (U.S.), University of Illinois-Chicago (U.S.), University of Strathclyde (U.K.), and The Cancer Council Victoria (Australia).

Independent variables:

Last quit method: Respondents who reported making a recent quit attempt at each wave were asked about methods of initiating quitting: “On your most recent quit attempt, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes you smoked?” Response categories were “Stopped suddenly”, or “Cut down gradually”.

Dependent variables:

Subsequent quitting activity: At follow-up waves 2 and 3, respondents were asked the question “Have you made any attempts to stop smoking since we last talked with you?” to which they answered yes/no as an indication of quitting attempts between waves. Among those who reported having made a quit attempt, they were also asked whether they were now back smoking or still stopped as an indication of quitting success. In the analyses reported here, we restricted quitting success to those who reported abstinence for 1 month or more. We conducted parallel analyses using 24-hour point prevalence and found the same effects.

Other control variables:

Demographics: The survey included measures of common socio-demographic variables: age, sex, education, annual household income, and ethnicity. Because education and income are not directly equivalent across the four countries, we have recategorised these two variables into low, moderate and high so that they are approximately comparable across the countries. Level of education consisted of three categories: high school diploma or lower (coded as low); technical, trade school, community college, or some university (coded as moderate); and university degree (coded as high). Annual household income was categorized into “under \$30,000“, “\$30,000-59,999”, and “\$60,000 and over” for the US, Canadian, and Australian samples. For the UK sample, we used the following categories: “£15,000 or under”, “£15,001-30,000,” and “£30,001 and over”. Minority status was assessed by using relevant Census question used in identifying minorities in official surveys conducted in each country and this was racial/ethnic group (US, Canada, and UK) and language other than English spoken at home (Australia). Respondents were classified as being in the identified minority group if they were non-white (US, Canada, UK) or spoke a

language other than English in the home (Australia). Otherwise, they were defined as “Other”.

Use of stop-smoking medications: Respondents were asked at each wave whether they were using medications for quitting: “In the last 6 months, have you used any stop-smoking medication?” Response choices were “Yes/No”. Those who answered “Yes” were asked: “Which medication or medications did you use?”. NRT products and prescription medications were recorded, and only known medications were included in the analysis as using medication.

Perceived dependence: Perceived dependence was assessed at each wave using the sum of scores of the following two measures: (1) “How hard is it to go without smoking for a whole day?” rated on a 4-point scale from “Not at all hard” to “Extremely hard”. (2) “How easy or hard would it be for you to completely quit smoking if you wanted to?” to which respondents could choose from very easy to very hard on a 5-point scale.

Perceived benefit of quitting: At each survey wave, smokers were asked, “How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 6 months?” Categories of the answer include: not at all, slightly, moderately, very much, and extremely. The variable was coded as a continuous measure from 1 (weak) to 5 (strong).

Self-efficacy of quitting: At each survey wave, current smokers were asked, “If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?” Categories of the answer include: not at all sure, slightly sure,

moderately sure, very sure, and extremely sure. The variable was coded as a continuous measure from 1 (weak) to 5 (strong).

Worries about health and quality of life: This variable was created based on smokers' responses to two questions asked at each wave: 1) "How worried are you, if at all, that smoking will lower your quality of life in the future?" 2) "How worried are you, if at all, that smoking will damage your health in the future?" Categories of the answers include: not at all worried, a little worried, moderately worried, very worried. Each variable was coded as a continuous measure from 1 (weak) to 4 (strong) and the average of the two measures is used in analysis since they are highly correlated (Pearson $r = .70$, $p < .001$ for both waves 1 and 2).

Attitudes about smoking: This variable was created based on smokers' response to the following two statements assessed at each wave: 1) "You enjoy smoking too much to give it up"; 2) Smoking is an important part of your life. Each variable was coded as a continuous measure from 1 (weak) to 5 (strong) and because the two measures are highly correlated, the average of the two measures was used in analyses.

Overall opinion of smoking: At each survey wave, respondents were asked "What is your overall opinion of smoking?" The response options ranged from "Very positive" to "Very negative".

Longest time off smoking: At each survey wave, respondents who were currently smoking were asked "What is the longest time that you stayed smoke-free?"

Tried to quit within last year: Respondents were asked at baseline wave whether they had made a quit attempt in the last year to which they could answer Yes or No.

Intention to quit: For this variable, respondents were asked at each wave whether they planned to quit in the next month, in the next 6 months, beyond 6 months, or not planning to quit. We labeled this variable in Tables 2 and 5 as “planning to quit sooner”.

Smoking frequency: This variable was assessed at each wave by asking participants whether they smoked on a daily, weekly or monthly basis. For the purpose of analysis, we dichotomized the variable into daily and less than daily smoking.

Cigarettes per day (CPD): Respondents who were still smoking at each wave were asked for their daily cigarette consumption but because the distribution of CPD is highly skewed, we decided to recode it into the following categories coded as: 0= \leq 10 CPD, 1=11-20 CPD, 2=21-30 CPD, 3=31+ CPD. We had decided to include the non-daily smokers in the group who smoked less than 10 cigarettes per day since there were so few of them (n=46) because of our inclusion criteria of at least 5 cigarettes a day.

Time to first cigarette upon waking: Time to first cigarette upon waking was asked of every respondent who reported still smoking at each wave. Once again, the frequency distribution of this measure was highly skewed and so it was converted into a categorical variable coded as: 0=61+ minutes, 1=31-60 minutes, 2=6-30 minutes, 3=5 minutes or less.

Statistical Analysis

All analyses were conducted using SPSS (Version 12.0) on both weighted and unweighted data. Weights were constructed based on information available from other national benchmark surveys in each of the four countries of the ITC study [see

Thompson et al. (2006) for more details]. The results from both weighted and unweighted analyses were very similar and so only weighted results are reported in the tables. Chi-square tests were employed to examine differences in categorical variables of interest. Multivariate logistic regression was used to examine the association between quit method chosen for last attempt and outcomes such as quitting success and relapse. The cross-product of prior quit method and subsequent quit method was used to examine the interaction between previous and subsequently chosen quit method on quitting success among a subgroup of smokers who had failed in an earlier attempt. The interactions between country and relevant independent variables were also examined in the predictive model.

Results

Prevalence of “cold turkey” and “cut down” quitting method by country

As can be seen from Table 1, at Wave 2, among those who made quit attempts, around two thirds of smokers reported quitting abruptly on their last attempt, with smokers from the UK having the highest proportion who did so and those from Canada the lowest. The use of quit methods was similar at both waves 2 and 3 although slightly more reported using “cold turkey” at wave 3.

<Insert Table 1 about here>

Factors associated with use of abrupt cessation on last attempt

Table 2 presents the results of the logistic regression analysis identifying factors associated with abrupt cessation among respondents who made a 24-hour quit attempt separately for data collected at wave 2 and wave 3. In both waves, smokers who

stopped abruptly were more likely to be aged 25 to 39 years old, come from the UK as compared to the other three countries, and to perceive themselves as being less addicted. In wave 2, they were more likely to be male, and smoked between 11-30 cigarettes per day. For wave 3, they tended to smoke at least 21 cigarettes per day, and were more likely to have high income. In all cases, the trends were similar in the wave with the non-significant findings. The cohort effect shows only a trend with those recruited at wave 1 being more likely to employ “cold turkey” approach for their last quit attempt. Motivational measures such as perceived benefit of quitting, attitudes about smoking and health concerns along with quitting self-efficacy were not significantly related to use of abrupt cessation.

<Insert Table 2 about here>

Quit method as independent predictor of subsequent quitting success and relapse

For quit success, our primary outcome was being quit for at least 30 days at interview. Bivariate analysis revealed that the use of “cold turkey” method is associated with better quitting rate than the use of “cut down” method (see Table 3). This result was evident in all four countries and also replicated in both waves. Using multivariate analysis, the results as shown in Table 4 revealed that smokers who used “cold turkey” to quit were almost twice as likely to succeed in their attempt compared to those who used the “cut down” method ($OR=1.95, p < .001$) after controlling for socio-demographic variables and relevant set of key predictors of quitting reported in Hyland et al. (2006) and use of medications in the attempt. This result was again replicated using data from wave 3 ($OR= 1.78$). We also found a significant cohort effect with those entering the study at Wave 1 being more likely to quit successfully.

We found no predictive effect of either use of medication or perceived dependence in this analysis for either wave.

<Insert Tables 3 and 4 about here>

We also examined the relationship between quit method used and subsequent relapse rate at Wave 3 among those who were quit at Wave 2 to assess the longer term effect of quitting strategy. There was a non-significant trend for the abrupt quitters to be less likely to relapse (that is, more likely to stay quit) over this 15-month period ($p=0.063$). After adjusting for socio-demographic factors, smokers who had quit abruptly were less likely to relapse ($OR=0.54$ ($0.29-0.99$), $p < .05$) as compared to those who had cut down.

Factors associated with quit success for smokers who employed each quit method

We also looked at factors influencing short-term (30 days) success for each quit method separately. The results are presented in Table 5. We used the same predictors used to assess the role of quit method in predicting success to see if there was any difference in predictors by method chosen. Because of the small sample size, we combined the data from waves 2 and 3 for this analysis. We included wave recruited as a control variable in the model. As can be seen in Table 5, the same variables were generally significant predictors for the two quit methods. The most notable differences were that high income smokers were only more likely to succeed using abrupt cessation, and surprisingly, use of stop-smoking medications was only a positive factor among those who cut down. There was also a curious opposite effect of refusal to provide income for the two quitting methods on quit success.

<Insert Table 5 about here>

Effect of prior quit method used on choice of method and success in the next attempt

We explored the effect of prior quit method on both choice of subsequent method and on quitting success among those interviewed at Wave 3 who reported failing a quit attempt at Wave 2. Cross-tabulation results among this subsample indicated that smokers who failed in the previous attempt were more likely to employ the same method again to quit in the next attempt ($\chi^2 (1)=46.26, p<.001$) but that this was less marked for the cut-down group (see Table 6).

<Insert Table 6 about here>

We also found that the quit method used in a prior failed attempt had no direct influence on subsequent quit success ($p=.655$) and that the method chosen in the attempt is what determined the rate of quitting success as before ($OR=2.42, p < .05$).

We also explored whether smokers who used “cut down” were less likely to make quit attempts in the next wave. If they were, this would support the reduced motivation hypothesis. However, there was no difference in rate of subsequent attempts ($p=0.79$) between the two groups.

Discussion

This study has shown a consistent and large difference in quit success as a function of method used, with abrupt cessation being clearly associated with more successful outcomes. This is true regardless of the quit strategy they used on a previous attempt.

The reason for the findings is not as clear. One major limitation of the present study is the fact that the findings are based on personal choice of the respondents with regards to the method they use to quit smoking in a naturalistic environment. Consequently, it is not possible to convincingly demonstrate that quitting outcomes are determined by the quitting method used. It cannot be due to those who choose to cut down never getting down to zero and actually quitting, as this study was restricted to those who actually stopped for at least 30 days.

We canvass two possible substantive reasons: that those who choose the gradual method are less motivated to quit, and/or that there is something about cutting down that actually sabotages the attempt. The motivational hypothesis is credible; to choose cutting down can be interpreted as indicating greater ambivalence about committing themselves to change. If motivation was less, then relapse would be more likely. This explanation would explain the strong finding in this study, and the absence of strong differences in studies where smokers were allocated to condition (e.g., Cinciripini et al, 1995). However, the problem with this “reduced motivation” explanation is that we found no indicators of motivation that predicted choice. We also failed to find any evidence of cold turkey users being more motivated because they were more confident of being able to succeed in their quit attempt. However, it could be argued that this set of measures was assessed at a time point far removed from when people were making a quit attempt and thus might not be sensitive enough to capture the motivation of people given its dynamic nature.

Some other factors not measured in our study might also be different between the two groups. For example, it is possible that those who chose a cutting down strategy in the present study were more prone to negative affect and depression, both of which have

been shown previously to be predictive of relapse (Walker et al., 2004; Wilhelm et al., 2004; Shiffman, 2005) but we can think of no compelling theory as to why this would be the case. We acknowledge this limitation of the study. So we were left to infer that perhaps method choice is a better measure of underlying motivation than what smokers can directly report. Unless we can come up with a plausible reason as to why what goes on before the quit attempt in cutting down makes things harder after the person has quit, this explanation needs to remain on the table.

The second plausible explanation is for a direct effect and it is a position previously articulated by Cinciripini et al. (1995; 1997). They argued that when the smoker cuts down on their own, they tend to retain the most valued cigarettes till the end. Thus their experiences just before actually quitting are of the few cigarettes they still smoke being more valued and more appreciated than would have been the case when they were smoking their normal amount. Thus cutting down sets up stronger positive expectancies for smoking, and it is these stronger expectancies that drive the higher rates of relapse. If this mechanism was in operation, we might expect that smokers allocated to cut-down conditions would do worse if they chose which cigarettes to forego. However, while Cinciripini et al. (1995; 1997) found that structured cutting down is superior to unstructured, it was similarly successful to abrupt cessation, thus they found no clear evidence of a detrimental effect in this structured program. Something else is clearly at work in our population-based sample. We are asking about use of delay versus ordinary reduction in subsequent waves of the ITC study in the hope that this might shed some light on the issue.

A definitive conclusion as to whether the effects are a function of the chooser or a function of the method chosen requires a randomised trial. However, given the large

effects we found, and the lack of a coherent model as to why gradual quitting might have a role, we think from a practical point of view it is reasonable to make a recommendation to use abrupt cessation in advice to smokers when they are quitting without structured assistance. Given that we could not definitively rule out the role of motivation, we acknowledge that recommending that less motivated smokers quit via cold turkey may not assure them of better outcomes.

Another technical limitation of the present study is the fact that the major outcome measure including quit success was based solely on self-report. However, previous reviews confirm the accuracy of self-report, and conclude that biochemical validation of smoking status is unnecessary in studies where there is no strong association between the interviewer and the respondent as was the case here (Glasgow et al., 1993; Patrick et al., 1994; Velicer, Prochaska, Rossi, & Snow, 1992), and we can think of no conceivable reason for differential bias in report of abstinence by means of achieving it. As our interviewers did no more than ask predetermined questions, and were not common for all assessments, we believe it is unlikely that any real relationship was formed. Furthermore, our ability to replicate the findings on the subsequent wave of the study suggests that the findings are robust.

We conclude that cold turkey is the preferred method of quitting and that with caution it should be the recommended method for initiating quitting for smokers who intend to do so on their own as it leads to better outcome in terms of quit rate and relapse prevention. This conclusion should not be extrapolated to specific structured program, where in some cases there is evidence that structured cut down strategies can be at least as effective.

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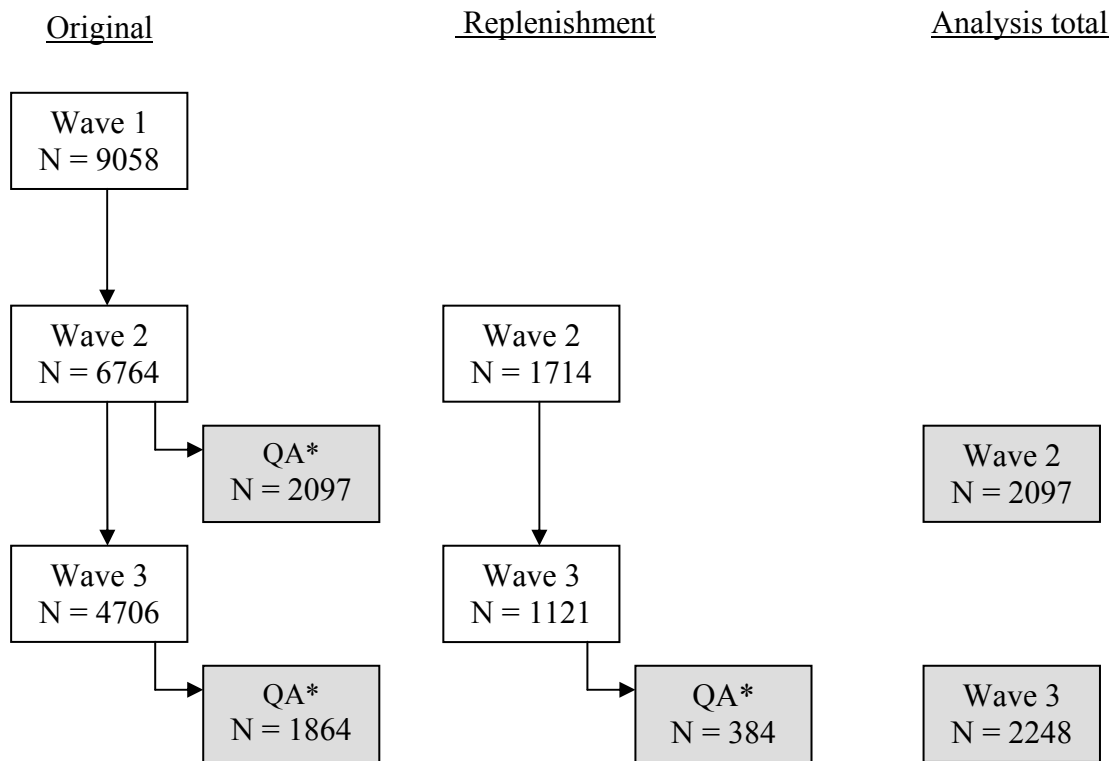
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Figure 1. A flowchart showing recruitment and the analytic sample for this study.



Note: * include those who reported having made a quit attempt (QA) and smoked at least 5 cigarettes per day

Table 1. Quitting method used for last quit attempt by country.

	Can	US	UK	Aus	Overall
% using cold turkey method in last quit attempt (of those making an attempt)					
At Wave 2 (n=1967)	64.8	67.4	73.1	68.8	68.5
At Wave 3 (n=2198)*	68.5	69.0	72.0	71.8	70.4

Note: Percentages in the table above are weighted to the age by sex distribution of smokers in the respective country.

* sample consists of continuing cohort of smokers recruited at Wave 1 and also those newly recruited at Wave 2.

Table 2. Logistic regression analysis: factors associated with the use of Cold Turkey to quit in last attempt reported at wave 2 (n=1825) and at wave 3 (n=1970).

Variables		Between waves quit method measured at...	
		<i>Adjusted OR (95% CI)</i>	
		Wave 2	Wave 3
Cohort	Wave 1 recruits	---	1.29 (0.99-1.65)
	Wave 2 recruits	---	Referent
Age	18-24	1.14 (0.79-1.63)	1.06 (0.74-1.53)
	25-39	1.56 (1.16-2.11)**	1.51 (1.13-2.03)**
	40-54	1.13 (0.85-1.51)	0.96 (0.74-1.26)
	55+	Referent	Referent
Sex	Male	Referent	Referent
	Female	0.72 (0.58-0.89)**	0.98 (0.79-1.20)
Minority status	Identified minority	Referent	Referent
	Other	1.28 (0.94-1.76)	1.09 (0.80-1.50)
Annual household income	Low	Referent	Referent
	Moderate	1.04 (0.81-1.34)	1.23 (0.96-1.57)
	High	1.23 (0.93-1.62)	1.58 (1.20-2.08)**
	Refused	1.14 (0.72-1.80)	0.83 (0.54-1.26)
Education	Low	Referent	Referent
	Moderate	1.16 (0.92-1.47)	1.06 (0.85-1.33)
	High	1.33 (0.95-1.86)	1.21 (0.88-1.65)
Country	Canada	0.88 (0.67-1.15)	0.81 (0.62-1.05)
	US	1.11 (0.81-1.53)	1.01 (0.75-1.36)
	UK	1.42 (1.05-1.91)*	1.36 (1.01-1.82)*
	Australia	Referent	Referent
Cigarette per day at Wave N-1	10 or less	Referent	Referent
	11-20	1.35 (1.05-1.73)*	1.24 (0.96-1.59)
	21-30	1.74 (1.21-2.48)**	1.49 (1.05-2.13)*
	31+	1.39 (0.83-2.34)	2.39 (1.33-4.29)**
Time to first cig upon waking at Wave N-1	> 60mins	Referent	Referent
	31-60mins	0.93 (0.66-1.31)	1.12 (0.82-1.53)
	6-30mins	0.92 (0.67-1.27)	1.06 (0.79-1.43)
	< 5mins	0.86 (0.58-1.28)	1.12 (0.78-1.60)
Perceived dependence at Wave N-1		0.87 (0.81-0.94)***	0.89 (0.83-0.96)**
Perceived benefit of quitting at Wave N-1		1.03 (0.93-1.15)	1.04 (0.94-1.16)

Planning to quit sooner at Wave N-1	0.90 (0.80-1.02)	0.95 (0.84-1.07)
Quitting self-efficacy at Wave N-1	0.98 (0.89-1.07)	0.97 (0.89-1.07)
Favourable attitudes about smoking at Wave N-1	1.08 (0.96-1.22)	1.12 (0.99-1.25)
Worries about health and QOL at Wave N-1	0.99 (0.88-1.14)	0.89 (0.79-1.02)
Use of stop-smoking meds at Wave N	0.98 (0.78-1.22)	0.84 (0.69-1.04)

NB. * $p < .05$, ** $p < .01$, *** $p < .001$; QOL= quality of life.

Table 3. Unadjusted relationship between quit method and quitting success.

	Can	US	UK	Aus	Overall
% abstinent for 1 month or more using the following quit method at each wave					
Cold turkey					
Wave 2 (n=1248)	22.7	22.3	26.0	17.1	22.0
Wave 3 (n=1504)	25.4	25.9	30.3	25.1	26.6
Cut down					
Wave 2 (n=601)	14.1	11.6	13.3	7.7	11.8
Wave 3 (n=652)	11.3	8.5	21.4	20.7	15.5

Note: Percentages in the table above are weighted to the age by sex distribution of smokers in the respective country.

Table 4. Quit method as an independent predictor of quitting success at waves 2 and 3 over and above the effects of socio-demographics & other known predictors of quitting.

Predictors	OR (95% CI)*	
	Wave 2 Quit 1 month or more (n=1710)	Wave 3 Quit 1 month or more (n=1659)
Cohort		
Wave 1 recruits	---	1.83 (1.24-2.69)**
Wave 2 recruits	---	Referent
Quit method used in last attempt		
Cold turkey	1.95 (1.44-2.63)***	1.78 (1.34-2.36)***
Cut down	Referent	Referent

Note: * Odds ratios are adjusted for the following: (a) socio-demographic variables such as age, sex, household income, education, ethnicity, and country; (b) known predictors of quitting (as reported in Hyland et al., 2006) such as prior frequency of smoking, prior cigarette per day, previously reported time to first cigarette upon waking, quit length of past attempt, prior self-efficacy of quitting, prior perception of benefit of quitting, previously reported worries about health and quality of life, previously reported favourable attitudes about smoking, previously reported whether they tried to quit within the year or not, previously reported overall opinion of smoking, and prior intention to quit smoking; and (c) other quitting related variables such as use of stop-smoking medications and perceived dependence.

Table 5. Logistic regression analysis: factors associated with quit for 1 month or more at either wave 2 or wave 3 for smokers who attempted to quit a) using cold turkey, and b) a cut down method.

Variables		Factors associated with quit for 1 month or more for....	
		<i>Adjusted OR (95% CI)</i>	
		a) Cold turkey (n = 1820)	b) Cut down (n = 856)
Cohort	Wave 1 recruits	1.15 (0.74-1.81)	1.53 (0.67-3.52)
	Wave 2 recruits	Referent	Referent
Age	18-24	0.74 (0.48-1.15)	0.89 (0.42-1.92)
	25-39	0.94 (0.68-1.31)	1.19 (0.66-2.13)
	40-54	1.02 (0.74-1.41)	0.83 (0.47-1.46)
	55+	Referent	Referent
Sex	Male	Referent	Referent
	Female	1.25 (0.99-1.58)	0.76 (0.49-1.17)
Minority status	Identified minority	Referent	Referent
	Other	1.35 (0.91-2.01)	1.02 (0.50-2.06)
Annual household income	Low	Referent	Referent
	Moderate	1.31 (0.97-1.77)	0.84 (0.50-1.40)
	High	1.71 (1.24-2.34)**	0.66 (0.37-1.17)
	Refused	1.90 (1.17-3.08)*	0.31 (0.10-0.95)*
Education	Low	Referent	Referent
	Moderate	0.73 (0.56-0.95)	0.99 (0.62-1.62)
	High	0.99 (0.71-1.39)	0.79 (0.38-1.67)
Country	Canada	1.14 (0.83-1.57)	1.91 (1.06-3.45)*
	US	1.38 (0.97-1.98)	1.39 (0.67-2.90)
	UK	1.43 (1.05-1.95)*	2.50 (1.32-4.72)**
	Aus	Referent	Referent
Cigarette per day at Wave N-1	10 or less	Referent	Referent
	11-20	0.90 (0.68-1.19)	0.67 (0.40-1.14)
	21-30	0.66 (0.44-0.98)*	0.86 (0.41-1.79)
	31+	0.66 (0.35-1.24)	0.85 (0.28-2.62)
Time to first cig upon waking at Wave N-1	> 60mins	Referent	Referent
	31-60mins	1.00 (0.70-1.44)	1.39 (0.70-2.73)
	6-30mins	0.92 (0.65-1.29)	0.64 (0.33-1.25)
	< 5mins	0.77 (0.49-1.20)	0.78 (0.35-1.73)

Smoking frequency at Wave N-1	Daily	1.61 (0.75-3.46)	0.69 (0.20-2.34)
	Non-daily	Referent	Referent
Tried to quit within the last year at Wave N-1	Yes	0.72 (0.49-1.04)	1.39 (0.73-2.68)
	No	Referent	Referent
Longest time off smoking at Wave N-1	Never	Referent	Referent
	1 week or less	0.59 (0.41-0.85)**	0.32 (0.16-0.64)**
	>1 week to 6 months	0.53 (0.38-0.74)***	0.51 (0.28-0.94)*
	6 months or more	0.92 (0.67-1.24)	0.91 (0.50-1.65)
Overall opinion of smoking at Wave N-1	Positive or neutral	Referent	Referent
	Negative	1.12 (0.85-1.46)	0.79 (0.48-1.29)
	Very negative	1.03 (0.73-1.46)	0.56 (0.29-1.07)
Perceived dependence at Wave N-1		1.01 (0.93-1.09)	0.97 (0.84-1.13)
Perceived benefit of quitting at Wave N-1		0.91 (0.81-1.03)	0.92 (0.74-1.15)
Quitting self-efficacy at Wave N-1		1.12 (1.00-1.24)*	1.24 (1.01-1.51)*
Favourable attitudes about smoking at Wave N-1		1.03 (0.90-1.19)	1.22 (0.96-1.55)
Worries about health and QOL at Wave N-1		0.90 (0.78-1.04)	1.04 (0.78-1.37)
Planning to quit sooner at Wave N-1		0.98 (0.86-1.13)	0.97 (0.75-1.26)
Use of stop-smoking meds at Wave N		0.84 (0.66-1.07)	2.60 (1.63-4.15)***

NB. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 6. The relationship between prior and subsequent choice of quit method among those who failed in the previous attempt.

Choice of quit method at Wave 2	Choice of quit method at Wave 3		
	Cold Turkey n=554	Cut-Down n=232	Total
Cold Turkey (n=522)	73.8	48.7	66.4
Cut-Down (n=264)	26.2	51.3	33.6

NB. The numbers in the table are weighted percentages. $\chi^2(1)=46.26, p<.001$.