

Understanding how mass media campaigns impact on smokers

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Objectives: To explore the immediate impact of the 2001 National Tobacco Campaign (NTC) advertising on movement towards quitting in a broadly representative sample of smokers.

Method: Repeated measures design with surveys two weeks apart. 1000 current smokers aged 18–40 were interviewed. 250 telephone interviews were conducted in each of Sydney and Melbourne (both unexposed at initial survey) and Brisbane and Adelaide (both exposed at initial survey) to measure frequency of negative thoughts about smoking and passive smoking, positive thoughts about smoking, and thoughts about the conduct of tobacco companies; perspective on change; and thoughts and actions about quitting.

Results: At the initial survey, those in regions exposed to the campaign were more advanced in thoughts about quitting. Between surveys, 33% progressed toward cessation and 21% regressed. 69% of participants reported recalling NTC advertising at follow up, which was significantly associated with greater self reported quitting activity and a greater increase in frequency of negative thoughts about smoking.

Conclusions: The results show increased frequency of negative thoughts about smoking and an increase in quitting related thoughts and actions following onset of the NTC campaign. There was also evidence of sustained increase in cessation activity for a month following onset of the campaign. This all occurred in the context of considerable naturally occurring smoking cessation activity, suggesting that the challenge of campaigns in Australia is to induce progress toward quitting among people who are generally engaged with the issue at some level, rather than attempt to stimulate fundamentally new consideration of smoking.

There is now considerable evidence that mass media anti-smoking counter advertising campaigns can stimulate quitting activity and can lead to detectable declines in smoking prevalence.^{1–3} It seems likely that for each smoker who successfully quits as a result of a campaign, several more will try and fail, and others will be motivated to think about quitting, but not get as far as trying. Currently, remarkably little is known about the mechanisms by which campaigns have their effects. The simple model of effects is that evidence about health effects of smoking changes beliefs, which in turn affects attitudes, driving interest in behaviour change. In Australia, almost all smokers are aware that smoking is both addictive and likely to do them harm,^{4–5} even though they do not have an appropriate understanding of the magnitude of the risks.⁶ Therefore, this model does not account for the fact that many smokers are not contemplating quitting, at least in the short term. We need to consider emotional responses to the evidence. Tobacco use can be usefully seen as a conflict between the experienced desire to smoke, which maintains use, and rational appraisal, which leads almost inevitably towards cessation. Cessation can therefore be a difficult task, one that needs to be pursued in the face of frequently felt desires to continue or resume smoking.

Graphic anti-smoking advertisements can charge mere facts with emotion and make them far more motivating. There is no doubt that communications with a strong affective component can be successful in motivating behaviour change.^{3,7} However, even this is not enough. If affective charge were sufficient, we would not expect the rapid drop off of interest in quitting that occurs once advertisements stop running.⁸ It seems that it is important to ensure that the issue remains sufficiently focal to stimulate appropriate action, as well as making the issue emotionally real.

We do not have a good scientific understanding of why interest in quitting decays rapidly after exposure to motivating events. However, in this regard it is not much different to other life tasks. To be carried out, tasks must get on, and stay on, the

agenda of things to do. With all difficult and/or unpleasant tasks, most people find it hard not to be distracted by more pleasant (in the short term) alternatives. This suggests a model of behaviour change where rational appraisal, even powered by emotionally felt need, may not be sufficient for behaviour change to take place unless that issue is kept on the agenda—that is, where relevant thoughts and feelings occur sufficiently frequently to drive engagement with change—throughout the change process until new stable patterns of behaviour are established. It seems likely that, for most people, regular cues to stimulate appropriate thoughts or feelings are critical to ensuring the issue remains on the agenda.

If we are to develop a better understanding of the impact of events such as bursts of anti-smoking advertising, it is important that we assess what reactions these provoke in smokers, and how and under what circumstances these reactions might lead to substantial attempts to quit smoking.

Another major challenge for assessing the impact of anti-smoking advertising campaigns is to use a sufficiently robust model of the process of behaviour change. The main model that attempts to consider cessation beyond the point where the person is motivated to try is the transtheoretical model (TTM) of Prochaska and associates.^{9–10} This model conceives of three major stages of readiness to change pre-cessation, and two stages post-cessation. The model has been subject to considerable criticism recently,^{11–13} however, alternative models begin by assuming engagement in the change process. We believe that there are fundamentally different issues involved in, say, getting somebody not interested to consider quitting from supporting someone who has set a quit date in implementing that plan. Communication needs to differ because the person's perspective on cessation is quite

Abbreviations: NTC, National Tobacco Campaign; TTM, transtheoretical model; TARPs, target audience rating points

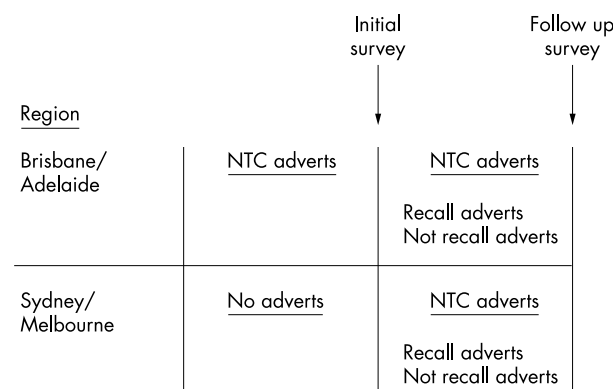


Figure 1 Schematic diagram of study design. NTC, National Tobacco Campaign.

different. We thus reconceive the TTM stages as important perspectives on change.

In examining progress towards cessation at a micro level, it may be useful to make more fine grained distinctions than those made in the TTM. In this regard we have subdivided each of the three pre-cessation stages of change into two: pre-contemplators have been split between those who were happy to smoke and those who think they should quit sometime; contemplators were split between those who said they were merely open to the possibility of quitting and those who were actually thinking about it; and preparers were split into those who had not set a quit date and those who had.

The aim of this study was to explore the impact of the 2001 National Tobacco Campaign (NTC) advertising that occurred in May to June 2001 on a broadly representative sample of smokers. It was not designed to demonstrate whether the campaign had a significant effect on cessation itself. We explored possible effects of the campaign on progression towards cessation and on other indices of engagement with the issue of cessation. In particular, we hypothesised that awareness of the campaign would trigger thoughts about quitting and/or harms of smoking and this would mediate more substantial cessation related activity.

METHOD

Design

The study was a repeated measure design following two groups of smokers: those who had been potentially exposed to advertising before an initial survey, and those who had not. Both groups were followed up two weeks after the initial interview, after the main period of NTC advertising to which all participants were potentially exposed. We looked for convergence between three lines of inquiry (see fig 1):

- (1) the natural experiment comparing the regions exposed to advertising at the initial survey with those not exposed
- (2) consideration of changes between the two surveys controlling for potential effects of recontact
- (3) relationships between recall of the campaign and outcomes.

Participants

Subjects were randomly selected from the electronic White Pages. The initial survey was conducted with 1000 people aged 18–40 years who smoke cigarettes weekly or more often. Two hundred and fifty telephone interviews were conducted in the metropolitan areas of Sydney and Melbourne (both unexposed at the initial survey) and in Brisbane and Adelaide (both exposed at the initial survey). In accord with specifications, exactly half of participants were female. The age distribution was 24% aged 18–24, 18% 25–29, 21% 30–34, and 37%

35–40. Most subjects (70.4%) had finished secondary school, and approximately a quarter (25.5%) had tertiary qualifications.

One hundred and nineteen subjects were lost to follow up, giving a retention rate of 88%. There was no significant difference between those followed up and those lost by sex, age, education, cigarettes per day, or perspective on change.

In addition, in Melbourne we interviewed 150 smokers or ex-smokers who had quit in the past two weeks at the same time as the post survey, as a control for any reactive effects of the initial survey.

Outcome measures

In both surveys subjects were asked about the frequency (in the past two weeks) of various thoughts about smoking. Each of these questions were scored 0 (not at all); 1 (don't know, or once or twice); 2 (a few times); 3 (at least once a day); or 4 (several times a day). Frequency of negative thoughts about smoking was the average of two items: "How often, if at all, did you (a) think about dangers and/or bad things about smoking?; or (b) think about the harm your smoking might be doing to you?" ($\alpha=0.82$). Frequency of concerns about passive smoking was based on the item: "How often, if at all, did you think about the harm your smoking might be doing to others?" Frequency of positive thoughts about smoking was assessed by the item: "How often, if at all, did you think good things about smoking?" Frequency of thoughts about the tobacco industry was assessed by the item: "How often, if at all, did you think about the conduct of tobacco companies?"

In the initial survey subjects were grouped into one of six perspectives on change, based on the TTM stage of change categories. Each pre-quitting stage was subdivided into two, providing six perspectives on change. At follow up a seventh perspective, recently quit, was added. Allocation to perspective was based on a branching series of questions: those not seriously thinking of quitting in the next six months (TTM precontemplators) were divided based on whether this was because they were (1) happy to smoke or (2) should quit sometime, but not soon. Those contemplating quitting, but not planning to quit, were divided based on whether they were (3) just open to the possibility of quitting or (4) actually thinking about quitting. Those planning to quit in the next 30 days (TTM preparers) were divided based on whether they had (5) made no firm decision to quit within the next two weeks or (6) set a quit date within the next two weeks. Those participants who were quit at the follow up survey were allocated to a seventh perspective, corresponding to the early part of the action stage of the TTM.

A measure of self reported quitting activity was based on thoughts and actions about quitting during the campaign period. At follow up, subjects were asked: "Have you changed, or thought about changing, your smoking behaviour in the last two weeks?" If yes, subjects were then asked what they had done. Subjects were grouped into the following categories of thoughts and actions about quitting: 0 (no change); 1 (thought about quitting); 2 (tried to cut down); 3 (decided to quit); 4 (quit but relapsed); and 5 (quit and succeeded). Quitting activity was also measured in terms of perspective change (progress, stable, or regress). More proximal outcomes were proportions reporting serious concerns about their smoking and serious thoughts about quitting, and the four measures of thought frequency, with only thoughts about harm of active smoking expected to be increased by the campaign.

Other measures

The initial survey contained questions to determine eligibility for the study. Apart from the questions repeated in the follow up survey (see below), it also included a range of demographic questions including sex, age, household composition, education level, country of birth, marital status, and occupational

status. Smoking related variables included usual cigarette consumption, time to first cigarette, ever tried to quit before, time since last quit attempt, duration of last attempt, ever use of pharmacotherapies for cessation (gum, patches, inhalers, and bupropion); last use of nicotine replacement therapy (product and timing); proportion of smokers among those they socialise with regularly; and openness to information on the harmfulness of smoking.

Recall of NTC advertising was assessed by asking participants: "In the last two weeks, have you noticed anything about tobacco smoking or its harms in the media, at work, at home or anywhere else?" Those answering "no" were then prompted: "During the past two weeks, have you seen, read, or heard any anti-smoking advertising on TV, radio, or in the newspaper?" Those answering "yes" to either question were asked to describe what they saw, read, or heard in the advert (multiple answers were accepted). Total responses were initially grouped into 33 categories, ranging from actual campaign related advertising (for example, "eye" advert) to incidental smoking related news in the media (for example, lawsuits related to passive smoking). Recall of NTC advertising was defined by any of unprompted or prompted recall of the "lung" advert, eye advert, or "Quitline" advert, which shows a man on the phone, as well as recall of the "Every cigarette is doing you damage" tagline that accompanied each advertisement.

Respondents were also asked to think about the advertising campaign as a whole, and rate whether it had made them more likely to quit (or helped them to stay quit), less likely to quit, or made no difference to their quitting intentions.

Analytical issues

We have attempted to test a model in which advertising has its effect by being noticed, which triggers relevant thoughts, which in turn stimulates quit related activity, leading eventually to increased cessation. Based on the changes in smoking prevalence that occurred over the much longer initial wave of the NTC,⁵ we would expect less than 1% of smokers to quit (over and above the background rate) in the period under consideration, a number that we lack power to reliably detect. We do, however, have considerable power to detect the greater percentage whom we might expect to progress towards cessation. Our approach is to look for consistency in findings across methods, which, if found, makes it unlikely that the findings are due to uncontrolled for factors from any particular analysis, especially where the uncontrolled factors are not common to all analyses.

Procedure

Initial survey data were collected from 17 May 2001 and completed prior to 22 May. Respondents in the initial survey agreed to be re-interviewed two weeks after their initial interview. The follow up survey was started almost immediately after World No Tobacco Day (WNTD May 31) and completed by 12 June.

Both the initial and follow up surveys took about 10–15 minutes to complete. The surveys were ordered such that most of the information about respondents' thinking and behaviour related to smoking was collected before they were asked about awareness of advertising and any impact they thought it had on their smoking.

NTC advertising

In Adelaide and Brisbane, the NTC advertising campaign began a few days prior to the initial survey, while in Sydney and Melbourne initial data collection was completed before the 22 May campaign launch. We call this comparison the regional effect, even though it is more correctly one of recent previous potential exposure to the NTC advertisements. In this paper, this effect will be explored and, where relevant, controlled for in the analysis. The regional differences were not a

planned part of the study, but we took advantage of the quasi-experiment it created.

Three TV advertisements were used: (a) tar on lung, which depicts a beaker of tar being poured over a lung with content detailing the amount of tar taken into the lungs each year; (b) eye, focuses on macular degeneration and depicts an eye in a clamp pulling back the eye lid, and; (c) man calling Quitline, depicting a caller to the Quitline service. The two health adverts used the framework used in previous NTC advertisements²⁻³ of depicting a smoker in a typical situation lighting a cigarette, then the camera following the smoke into his/her lungs, cutting to the core health message (outlined above), then seeing the smoker exhale apparently oblivious to the harms.

In Adelaide and Brisbane NTC advertising was first screened in the week beginning 6 May 2001. In Brisbane all three NTC adverts were shown throughout May. Target audience rating points (TARPs; a standard measure of the weekly volume of television advertising weight scheduled to reach the target audience) increased for each advertisement from low to medium levels by the week beginning 27 May. In Adelaide, only the man calling Quitline advertisement was shown prior to the initial survey, with TARPs for this advertisement increasing from low to medium in the two weeks prior to the campaign period. During the following two weeks (beginning 20 May), TARPs for this advertisement decreased slightly. In the second week of the campaign (beginning 27 May), the tar and eye advertisements received heavy exposure in the Adelaide media.

In Sydney and Melbourne NTC advertising commenced in the week beginning 20 May 2001. TARPs for each advertisement were low in the first week of the campaign in both cities, but increased to medium to high levels in the second week (beginning 27 May). In both cities, particularly in Melbourne, the eye advertisement was given the highest exposure.

RESULTS

Characteristics of the sample

Of the initial 1000 respondents 93% were daily smokers, with the remaining 7% smoking less often than daily. Participants reported smoking an average of 15.6 cigarettes per day, with a median time to first cigarette of 30 minutes. There was a tendency for males to smoke more cigarettes per day than females, although this did not reach statistical significance ($t(997)=1.92$, $p=0.056$). There was a significant trend for consumption to increase linearly with age ($f(3,987)=14.83$, $p<0.001$), with those in the 18–24 age group smoking an average of 12.8 cigarettes per day compared with 17.2 cigarettes per day among those aged 35–40. There was also a significant trend for consumption to decrease linearly with educational attainment ($f(4,983)=8.55$, $p<0.001$), with those who did not complete secondary school having the highest daily consumption (17.6 cigarettes per day).

Overall, 7% of respondents reported that all of their friends with whom they socialise regularly smoke, and a further 29% said more than half (but not all) of their friends are smokers. Only 4% reported that none of their friends smoke. At the initial survey, 44% of respondents said that during the past two weeks family or friends have been trying to get them to quit.

Respondents were asked whether they had ever tried to quit smoking, and if yes, how long ago was their last attempt. Overall, 73% said they had previously tried to quit, with 39% having made an attempt in the past year and 35% having tried more than 1 year ago (or were unable to remember when).

At the initial survey, 43% of respondents were in one of the two perspectives in the precontemplation stage as defined by the TTM (either happy to smoke or not currently thinking about quitting). It is notable that only 7.5% of smokers reported being happy to keep on smoking (see table 1). Thirty eight per cent were in the two perspectives that correspond to

Table 1 Proportion of respondents in each initial perspective on change by region

Initial perspective	Region		Total
	Adelaide/ Brisbane	Sydney/ Melbourne	
Happy to smoke	7.4%	7.6%	7.5%
Should quit sometime, not soon	30.0%	40.8%	35.4%
Open to possibility	16.6%	14.6%	15.6%
Considering quitting, not in next 30 days	23.4%	20.8%	22.1%
Planning, not in next two weeks	15.8%	12.0%	13.9%
Quit date within next two weeks	6.8%	4.2%	5.5%

the contemplation stage, being either merely open to the possibility of quitting, or considering quitting, but not planning to quit in the next 30 days. The remainder of the sample (19%) were in the fifth or sixth perspectives; that is the preparation stage, either planning to quit (but not in the next two weeks), or having set a quit date within the next two weeks.

χ^2 Analyses showed that there was no difference in initial perspective on change by sex, age, educational attainment, or employment status. There was an association with prior quitting activity. Not surprisingly, those in perspective three and above were more likely to have previously tried to quit ($\chi^2(5)=86.63$, $p < 0.001$). Only 51% of those "happy to smoke" had previously tried to quit, compared with 89% who had set a quit date within the next two weeks.

Regional differences in the initial survey

Just under half (45%) reported awareness of the NTC advertising in the initial survey. There was a highly significant difference by region ($\chi^2(1)=179.92$, $p < 0.001$), with 62% of participants in Adelaide and Brisbane recalling having seen at least one advertisement, compared with 21% in Sydney and Melbourne. The tar advert was by far the most commonly seen advertisement, with 37% of all respondents reporting having seen it. Overall recall was linearly related to initial perspective. Given the regional effect, we also explored this by region. For Adelaide/Brisbane, the linear association between recall of the NTC and initial perspective was of marginal significance ($p=0.053$), however, there was no linear association among participants in Sydney/Melbourne ($p=0.568$). The following analyses explore differences by region to explore effects of differential exposure without concern about differential recall.

As can be seen from table 1, a significant difference was found in the perspective distribution of the sample in the initial survey by region, with participants in Adelaide and Brisbane being more likely to be in a more advanced perspective on change than participants in Sydney or Melbourne ($\chi^2(M-H)=11.21$, $p < 0.001$). Consistent with this, more

reported serious thoughts of quitting in the past two weeks (43% c.f. 35%; $\chi^2(1)=6.4$, $p=0.014$) and there was a non-significant trend for more to report serious concerns about their smoking over the same period (68% c.f. 63%; $\chi^2(1)=2.99$, $p=0.08$). There were also more frequent negative thoughts about active smoking (mean, 1.93 c.f. 1.73; $t(998)=2.3$, $p=0.02$), but no differences in thoughts about passive smoking, good things about smoking, or about the tobacco industry.

Changes in quit related activity between surveys

We now turn to analysis of changes between the two surveys. Table 2 shows the perspective distribution of the sample at the initial survey, cross tabulated with perspective at follow up. The correlation between the two assessments was 0.65 ($p < 0.001$). Of the 881 participants for whom we have follow up data, a third (33%) progressed towards cessation (above the diagonal in table 2), including 5% who were quit at follow up. By contrast, only 21% regressed, but some of this was via a failed quit attempt (2%). This means there was a net progression of 12% more who progressed than regressed. The happy to smoke group and the should quit, but not thinking about it, group were the most stable (both 62% stable). The percentage at least planning to quit in the next 30 days (perspectives 5 and above) rose from 20% in the initial survey to 27% at follow up (see table 2).

Greater progression to more advanced perspectives took place for each successive initial perspective apart from perspectives 3 and 4. Here 30% of those in perspective 3 in the initial survey progressed to perspectives 5 or beyond, while only a quarter (25%) of those in perspective 4 did so. There were no regional differences in the three level measure of perspective change ($\chi^2(6)=3.25$, $p=0.777$).

As was found in the initial survey, at follow up participants in Adelaide and Brisbane were more likely to be in a more advanced perspective on change than participants in Sydney or Melbourne ($\chi^2(M-H)=7.39$, $p=0.007$).

On the measure of self reported quitting activity (follow up only), a third (34%) had only thought about quitting, 20% had tried to cut down; 2% of participants had decided to quit smoking, and 7% had made a quit attempt, leaving only 37% who said they had done nothing in the two week period between the surveys. Self reported quitting activity differed significantly by region ($F(1,879)=5.30$, $p=0.022$), with those in Adelaide and Brisbane reporting a higher mean score (1.24) than those in Sydney and Melbourne (1.04). Forty per cent of participants in Sydney and Melbourne had not changed or thought about changing their behaviour, compared with 34% in Adelaide and Brisbane. This may be explained by the Adelaide/Brisbane sample being relatively more advanced in perspective at the initial survey, perhaps due to the early exposure to the campaign. Higher scores on the measure of self reported activity are indicative of actual behaviour change (making a quit attempt), rather than of taking one's first steps

Table 2 Cross tabulation of perspective at the initial survey and perspective at follow up (percentage within each initial perspective)

	Follow up perspective							Total n	% of total
	1	2	3	4	5	6	7		
Initial perspective									
1	62.3%	31.1%	3.3%	0%	1.6%	0%	1.6%	61	7.5
2	4.9%	62.1%	17.2%	8.1%	5.8%	0.3%	1.6%	309	35.4
3	2.1%	22.1%	24.3%	15.0%	21.0%	4.3%	5.0%	140	15.6
4	0%	16.2%	18.7%	40.4%	18.7%	3.0%	3.0%	198	22.1
5	1.7%	3.3%	9.1%	17.4%	43.8%	14.9%	9.9%	121	13.9
6	0%	3.8%	3.8%	11.5%	28.8%	19.2%	32.7%	52	5.5
Total n	58	280	143	166	145	41	48	881	
Percentage of total	6.6	31.8	16.2	18.8	16.5	4.7	5.4		

Table 3 Frequency in the past two weeks of negative thoughts about smoking, positive thoughts about smoking, and thoughts about the conduct of tobacco companies by follow up perspective on change

	Overall (n=881)	Follow up perspective							F (6, 874)	p
		1	2	3	4	5	6	7		
Negative (self)	2.1	0.5	1.5	2.2	2.6	2.8	3.0	2.8	47.24	<0.001
Negative (others)	1.5	0.7	1.2	1.6	1.4	2.0	2.2	1.7	10.09	<0.001
Positive	0.8	0.9	0.8	1.0	0.6	0.8	1.1	1.0	1.66	0.128
Tobacco companies	0.5	0.2	0.4	0.4	0.4	0.6	0.6	0.5	1.63	0.136

Scoring: 0 = never/do not know; 1 = once or twice; 2 = a few; 3 = at least daily; 4 = several times a day.

toward quitting, such as thinking about quitting or planning to cut down.

In both surveys, smokers were asked about recency of thoughts about quitting (assumed in those who said they were planning to quit in the next 30 days), and also recency of concerns (again those professing concerns as a function of their perspective were assumed to be concerned). Overall, concerns in the past two weeks rose from 65.4% in the initial survey to 70.9% at follow up.

Thoughts of quitting in the past two weeks rose from 39.3% in the initial survey to 62.9% at follow up. It should be noted that this question was asked differently at follow up, and this might be responsible for some of the change over time. It was only asked of those who replied “no” to “Have you changed, or thought about changing, your smoking behaviour in the last two weeks?” Those who replied “yes” were assumed to have had thoughts recently. Some of those who replied “cutting down” may not have thought seriously about quitting. If we assume none did, thoughts of quitting would drop to 42.7%, still marginally above the level in the initial survey (and here, unlike at follow up, preparers were assumed to have such thoughts).

There was little difference by region in change in recent concern about smoking. In those cities exposed to the campaign prior to the initial survey, concern in the past two weeks increased from 68% to 73%, whereas in those cities unexposed at the initial survey, recent concerns increased from 63% to 69%. For thoughts of quitting, in those cities with exposure at the initial survey thoughts in the past two weeks rose from 43% to 66%, while in those unexposed at the initial survey frequency of thoughts in the past two weeks rose from 35% to 60%.

In both surveys respondents were asked a series of three questions about the frequency of negative thoughts about smoking over the previous two weeks. In the initial survey, thoughts about “the dangers and other bad things about smoking” were reported at least daily by 35%, less often (or cannot say) by 35%, and not at all by 30%. Thoughts about “the harm your smoking might be doing you” were reported at least daily by 38%, less often by 37%, and not at all by 26%. These two questions were correlated 0.67 in the initial survey, so we combined them into a scale of negative thoughts about smoking ($\alpha=0.82$). Thoughts about “the harm your smoking might be doing to others” was reported at least daily by 26%, less often by 29%, and not at all by 45%.

There was a significant relationship between the frequency of negative thoughts about smoking and perspective on change in both surveys. Data from the follow up survey are presented in table 3. Subjects with less advanced perspectives reported fewer negative thoughts about smoking than those who had progressed further towards cessation. Those who reported being happy to smoke (perspective 1) reported few negative thoughts about smoking, with a rise in frequency of thoughts to perspective 5, from which point they plateaued. A similar although smaller effect was found for frequency of concerns about harm to others. There was no difference by

perspective in frequency of positive thoughts about smoking, or in thoughts about the conduct of tobacco companies.

Overall, there was a net shift to thinking more negative thoughts about smoking from the initial survey to follow up (mean: 1.83 to 2.12). About half of the participants (47%) reported a greater frequency of negative thoughts about smoking at follow up than at the initial survey, 27% reported the same levels, and 26% reported less negative thoughts. By contrast, there was no net change in positive thoughts about smoking, with 21% saying more, 60% no change, and 19% less. We found no clear regional difference in frequency of negative thoughts about smoking, but a trend for participants in Adelaide and Brisbane to report more frequent negative thoughts about smoking than participants in Sydney and Melbourne ($f(1,879)=2.97$, $p=0.085$). The interaction term was not significant, so there appears to have been equivalent increases in thoughts in the two regions (see table 4).

Participants in Adelaide and Brisbane reported significantly more negative thoughts about passive smoking than participants in Sydney and Melbourne ($f(1,879)=5.22$, $p=0.006$), however, again the interaction term was not significant. For positive thoughts about smoking, there was no significant interaction with region ($f(1,879)=0.29$, $p=0.593$), nor were there any significant main effects.

The cross sectional relationship between perspective on change and frequency of negative thoughts about smoking implies that experiencing more frequent negative thoughts is related to progression toward quitting. We also looked at the relationship between changes in thoughts and perspective at follow up. Apart from the overall increase described above, we found a significant interaction, which appears to be due to less increase (or a non-significant decrease) between the initial survey and follow up in thoughts among those in the happy to smoke and should quit groups at follow up.

Control for effects of being interviewed

We controlled for the effect of the repeated surveying by having a post only group in one city (Melbourne). Overall, 61% of the post only group recalled NTC advertising compared with 69% of the recontacted group ($p=0.11$). It is notable that in this survey ($n=150$) 74% reported changing their smoking

Table 4 Mean levels of negative thoughts about smoking at the initial survey and at follow up by region

Region	Frequency of negative thoughts about smoking (harm to self and harm to others)				n
	Initial		Follow up		
	Self	Others	Self	Others	
Brisbane/Adelaide	1.93	1.48	2.17	1.58	448
Sydney/Melbourne	1.73	1.32	2.08	1.33	433
Total	1.83	1.40	2.12	1.46	881

Table 5 Recall of advertising campaign by perspective at follow up

Advertisement	Follow up perspective (%)							χ^2	df	p
	1	2	3	4	5	6	7			
Lung	46.6	56.1	54.5	60.8	67.6	73.2	64.6	14.56	6	0.024
Eye	15.5	20.0	27.3	22.3	25.5	31.7	22.9	7.07	6	0.315
Quitline	0	5.0	9.1	7.2	5.5	4.9	12.5	10.33	6	0.111
Total	51.7	65.4	68.5	69.3	76.6	78.0	75.0	15.96	6	0.014
n	58	280	143	166	145	41	48			

behaviour or thinking about quitting, compared with only 58% in the re-contacted group in Melbourne ($n=216$; $p=0.003$). Further, although not significant, the perspective profile of the two groups differed slightly, with more in preparation or above in the post only group. There was also a trend for more thoughts about smoking harms in the post only controls ($p=0.20$). There is no evidence of the previous contact stimulating more thoughts or actions. If anything, re-contact may have increased awareness of material but reduced reported effects.

Quit related activity and recall of the NTC campaign

At follow up, 69% reported unprompted or prompted recall of the NTC advertising. Of those who recalled having seen NTC advertising, 86% recalled having seen the tar or lung advert, 33% recalled the eye advert, and 9% recalled the Quitline advert. At follow up, recall of NTC advertising was still higher in Adelaide/Brisbane (72%) than Sydney/Melbourne (65%; $\chi^2(1)=4.97$, $p=0.026$). There was a significant difference in recall by perspective ($\chi^2(6)=15.96$, $p=0.014$), with recall increasing up to perspective five (planning to quit), then plateauing (see table 5).

Participants were asked about the impact of the NTC advertising, and that of other tobacco events/activities that they also recalled, on their intention to quit smoking. Of the 605 respondents who reported seeing NTC advertising, 58% reported that the tobacco related activity they had seen had made them more likely to quit or helped them to stay quit; 41% said that it had made no difference to their intention to quit, and only 2% reported that the tobacco related activity had made them less likely to quit smoking. As expected, the impact of tobacco related activity on intention to quit smoking was significantly related to perspective at follow up ($\chi^2(6)=60.32$, $p<0.001$).

Among those who reported seeing NTC advertising at follow up, perspective progression occurred for 34%, including 6% who were quit at follow up. Only 19% regressed, resulting in a net progression of 15%. The percentage at least planning to quit in the next 30 days among those who reported seeing NTC advertising rose from 21% in the initial survey to 30% at follow up, an increase of 41%. Of the 276 participants who did not recall NTC advertising, perspective progression occurred for 30% (with 4% having quit), with 24% having regressed. This resulted in a net progression of only 6%. The percentage at least planning to quit in the next 30 days among this group rose from 17% in the initial survey to 20% at follow up, an increase of 19%.

Participants who recalled NTC advertising reported significantly higher scores on self reported activity ($t(879)=-3.16$, $p=0.002$) than those who did not recall NTC advertising. However, there was no significant relationship between recall of the campaign and the simple three level measure of perspective change, in which participants were categorised into having progressed, regressed, or been stable in their perspective on change from the initial survey to follow up ($\chi^2(2)=3.40$, $p=0.183$).

Analysis was carried out to explore the relationship between recall of NTC advertising at follow up and change in

the frequency of negative thoughts about smoking. Those who recalled NTC advertising reported a significantly greater increase from the initial survey to follow up in the frequency of negative thoughts about smoking than those who did not recall NTC advertising ($f(1,879)=5.38$, $p=0.021$). Recall of NTC advertising was also associated with a higher frequency of negative thoughts at follow up, as would be expected ($t(879)=-4.88$, $p<0.001$). Surprisingly, those who recalled NTC advertising reported a significantly greater increase in the frequency of positive thoughts about smoking than those who did not recall the campaign ($t(594)=-2.55$, $p=0.011$), suggesting that among those who do not progress, increases in negative thoughts about smoking prompted by the campaign are compensated for by increases in positive thoughts about smoking. However, the correlation between the two measures of change in frequency of thoughts ($r=0.04$) was not significant ($p=0.231$). We explored this rise in positive thoughts in more detail, and established that rises in positive thoughts about smoking were unrelated to progression toward quitting.

After controlling for initial recall of NTC advertising, frequency of negative thoughts at the initial survey was significantly associated with recall of NTC advertising at follow up ($f(1,877)=5.99$, $p=0.015$), indicating that those who thought more frequently about the harms of smoking prior to the campaign were more likely to subsequently report seeing NTC advertising. We explored whether the effect of recall of NTC advertising on increases in the frequency of negative thoughts about smoking could be attributed to differences in initial levels of negative thoughts. A hierarchical regression analysis found a significant independent relationship between change in the frequency of negative thoughts and having seen NTC advertising ($t(2)=4.12$, $p<0.001$), demonstrating that this relationship persisted after controlling for initial levels of negative thoughts.

DISCUSSION

The method used in this study shows some promise as a means of better understanding the impact of community events on smoking cessation. A number of new insights have been gained into the effect of a period of mass media anti-smoking advertising as well as some insights into the quitting process itself.

Before we go on to discuss the findings, it is important to underline the limitations of this study. First and foremost, there is no control community who were not exposed to the campaign at all. The regions exposed at the initial survey had higher scores on measures of concern and progression towards smoking, suggesting that there is a real effect, but it could be due to differences between the two cities exposed (both around 1 million inhabitants) and the larger two cities not exposed (both around 3 million inhabitants). Secondly, some of the changes observed between the surveys may have been reactive effects to completing the survey; that is it encouraged them to think about their smoking and thus generated some of the same kinds of outcomes as the campaign. As noted in the results, we found no evidence of reactive effects creating increased reported activity, indeed the post

only group reported stronger reactions, if anything. Thirdly, the analyses using reported awareness of the campaign may be biased in that those who take more action are more likely to report awareness. This is true, and would still be true even if we collected the measures in separate surveys. The similar pattern of results found when not relying on self reported exposure makes this explanation an unlikely cause of the observed differences. Fourthly, there could have been some other intervening event that caused the changes, however, we can think of none. Fifthly, there is a built in bias towards a small degree of progression toward quitting. Ex-smokers at the initial survey were not included, so regression from ex-smoker stages cannot be assessed. The magnitude of the bias is approximately the size of the percentage who were quit, if we assume similar numbers of regressions from ex-smoking to those who progressed to quit (a conservative assumption, in reality there is likely to be a net excess of quitters). Finally, it could be that the campaign was relatively ineffective and there has been less change in the impact variables than might be expected for a successful campaign. We did not find a marked difference in cessation between groups, so cannot rule out this possibility. If this were true, it would suggest we might find even stronger effects for a campaign that stimulated more actual quitting. It is also possible that the main effect on quitting is delayed, but we think that unlikely as there were only marginally more quitters at follow up in the regions that had several weeks of exposure (5.8%) than those with more recent exposure (5.1%). It would be desirable to extend and expand a study such as this to be powered to both detect and follow up effects on long term cessation.

We now turn to an analysis of the insights this study provides into how mass media campaigns work and on the context in which they are currently occurring in Australia.

The pattern of results we found is consistent across the three strands of analysis, although some of the differences did not reach conventional criteria for significance. Cross sectional differences were found by region at the initial survey as expected; there were changes from the initial survey to follow up that are consistent with campaign effects; and these appeared to be greater among those most engaged by the campaign (that is those reporting awareness). Further, there were expected changes in the proximal measures of thoughts about harms. The results are least clear on demonstrating perspective progression, where only non-significant trends were found. However, this is a blunt measure: those who do something and fail are often counted as "failures"; and those most likely to be affected (that is those in advanced perspectives) have less scope to progress. On balance, it seems reasonable to attribute the bulk of the differences found to the campaign activity and to conclude there was net increases in cessation related activity, even if there is no clear evidence of increases in actual cessation. Other studies, using different methodology, have found effects on cessation of other parts of the NTC campaign²⁻³ and of well crafted mass media campaigns generally,¹⁴⁻¹⁵ and we have no evidence that this campaign was not successful in that regard.

Frequency of negative thoughts about smoking was related to campaign activity as predicted. Mean levels of negative thoughts were higher in Adelaide and Brisbane, where NTC advertising was screened prior to the initial survey, increased between initial and follow up interviews, and were higher in those reporting awareness of advertising. It is likely that actual exposure to NTC advertising contributed to this effect. It is also notable that these thoughts increased by initial perspective on change, suggesting their importance in the quitting process.

In parallel to increasing negative thoughts about smoking, the campaign appears, to a lesser extent, to have stimulated increased reactive thoughts about the benefits of smoking. This effect is not necessarily a problem, as we found no negative association between levels of positive thoughts about

smoking and any of the indices of progression toward quitting. An earlier study conducted by our group¹³ found that an increased frequency of doubting the worth of quitting was predictive of cessation before a quit attempt, but having such thoughts post-cessation was predictive of relapse. Prior to making a quit attempt, confronting one's doubts about quitting and the perceived benefits of smoking may be an important part of the quitting process, perhaps by enhancing awareness of problems that need to be faced.

The quasi-experiment we exploited (in which the intervention commenced in one region prior to the initial survey) provides evidence that advertising can be of continuing benefit for at least 3-4 weeks. The higher level of self reported activity in Brisbane and Adelaide at follow up, and similar increases in levels of negative thoughts about smoking (to the comparison cities), both point to a building on of early exposure. That is, the campaign appeared to continue to generate increased negative thoughts about smoking and consequent action, at least for the period in which advertising was in place in Adelaide and Brisbane (about four weeks in total at the point of the follow up survey). Taken together, these findings support the conclusion that mass media anti-smoking advertising should be kept on for extended periods. The results strongly suggest cumulative benefits for advertising for at least 3-4 weeks. Further research is needed to determine at what point (if any) the impact of advertising on cessation activity begins to decline.

The study also provided evidence of considerable levels of naturally occurring cessation activity. Regardless of prior exposure to the campaign, the majority of participants were at least open to the possibility of quitting, and most were concerned about their smoking and/or had tried to quit in the past. The other most important finding is that the campaign reached a high proportion of smokers, and demonstrated the capacity to stimulate activity even in a significant minority of those who in the initial survey indicated little or no interest in quitting in the foreseeable future.

We found evidence of high levels of instability of perspectives, which may have implications for models of the quitting process. For example, among those who reported being merely open to the possibility of quitting in the initial survey, less than a quarter (24%) remained in this perspective two weeks later. Only among precontemplators did the majority remain in the same perspective from the initial survey to follow up, and even among these two perspectives there was considerable instability. It appears that to be in the happy to smoke perspective requires very infrequent thoughts about smoking related harm. However, for later perspectives high frequency of thoughts does not guarantee progression, suggesting that the conclusions drawn from those thoughts may be just as important, if not more so, than the mere level of activity. This analysis suggests utility in considering stages of change as states of mind or perspectives on change. It also highlights the need for more sophisticated analysis of what moves thinking about an issue towards action. Frequency of thinking seems to be important, but there is a need to identify other factors.

In Australia, anti-smoking campaigns are thus presented in a context where most smokers are actively concerned about the issue. The challenge is to induce progress toward quitting among people who are generally engaged with the issue at some level, rather than attempt to stimulate fundamentally new consideration of smoking. The role of advertising in this context is mainly to attempt to galvanise appropriate progression in thoughts towards effective action (that is quitting smoking), rather than to introduce the issue to those who are not thinking about it at all. Naturally occurring cessation activity is therefore given focus and direction by mass media advertising campaigns, propelling those contemplating quitting, who otherwise may not have progressed, towards increased consideration of the problem.

This study also demonstrated considerable predictive utility of stages of change (perspectives in this case) on progression. The data suggest that it is worth communicating with virtually all smokers about quitting, as we found that only those in the first perspective on change (those who reported being happy to smoke) are unlikely to be open to this. However, even among this group, over one third progressed to a more advanced perspective between surveys. TV advertising campaigns appear to have their effects, by at least in part stimulating increased frequency of thoughts about harm, which pushes smokers to consider action. It is less clear as to what is required to get that increased thought to result in greater moves towards cessation.

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