

# Tobacco Control

**Are anti-smoking social norms associated with tobacco control mass media campaigns, tax and policy changes? Findings from an Australian serial cross-sectional population study of smokers.**

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10 **Are anti-smoking social norms associated with tobacco control mass media campaigns,**  
11 **tax and policy changes? Findings from an Australian serial cross-sectional population**  
12 **study of smokers**  
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33  
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10 **ABSTRACT (245 words)**

11 **Background:** Anti-smoking social norms are associated with subsequent quitting behaviours.  
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13 We examined if exposure to tobacco control advertisements and policy changes predict  
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15 subjective (perceived disapproval of smoking among close family and friends) and  
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17 internalised injunctive norms (embarrassed about telling others you are a smoker).  
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20 **Methods:** A serial cross-sectional population survey of Australian adult smokers (n=6,649;  
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22 2012-2015). Logistic regression analyses examined associations of social norms with  
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24 exposure to different types of tobacco control advertisements, tax increases and other tobacco  
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26 control policies, adjusting for key demographic, smoking and media exposure covariates.  
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28 Interaction analyses examined differences by age and socio-economic status (SES).

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30 **Results:** Greater past month exposure to predominantly fear-evoking advertisements was  
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32 associated with increased odds of perceiving disapproval (per 1000 Gross Rating Points  
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34 (GRPs): adjusted odds ratio (AOR) 2.69, 95% Confidence Intervals (CI): 1.34, 5.39), while  
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36 exposure to advertisements evoking multiple negative emotions (fear, guilt, sadness) reduced  
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38 perceived disapproval (AOR 0.61, 95% CI: 0.42, 0.87). Increased perceived disapproval was  
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40 also associated with anticipation (AOR 1.38, 95% CI: 1.02, 1.88), and implementation of a  
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42 series of annual 12.5% tobacco tax rises (AOR 1.41, 95% CI: 1.03, 1.94). Associations were  
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44 consistent across age and SES. There were no associations nor subgroup interactions between  
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46 advertisement exposure or policy changes and feeling embarrassed about telling others you  
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48 are a smoker.

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50 **Conclusion:** Smokers' perceptions of family and friends' disapproval of their smoking was  
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52 more common after exposure to fear-evoking tobacco control campaigns and after large  
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54 tobacco tax increases were announced and implemented.  
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## INTRODUCTION

Anti-smoking mass media campaigns can motivate quitting, with the most effective advertisements across age and socio-economic (SES) groups evoking strong negative emotions.(1, 2) Increases in tobacco tax reduce smoking intensity and prompt quitting,(3, 4) especially among price-sensitive lower SES and younger smokers(5, 6). Smoke-free policies,(7-9) pack health warnings(10-13) and plain packaging(14, 15) also increase quitting motivation, intentions and behaviours.

In addition to these direct effects, tobacco control mass media campaigns and policy changes are thought to also influence broader social norms about smoking, with these social norm changes indirectly motivating smokers to quit and helping them to stay quit.(16-19) There is good evidence to indicate smokers who perceive more negative social norms about smoking are more likely to intend(20-24), attempt to quit,(23-28) and report long-term abstinence,(25, 29) and that pro-smoking social norms can inhibit cessation.(21) There is less evidence demonstrating which types of campaigns and policy changes can influence anti-smoking social norms.(21, 25, 28, 30, 31)

Social norms can be defined as shared societal expectations that guide social behaviour, although there are many different types.(32, 33) Subjective norms are perceptions about what important people expect one to do, descriptive norms are perceptions of the prevalence of a behaviour, and injunctive norms are perceived pressures to conform to avoid social sanctions.(32) Recent reviews suggest social norms are most likely to influence behaviour when they are internalised as part of one's social identity and are contextually relevant(32, 33). Social norms are thought to effect behaviour when that person perceives their actions threaten their desired social identity within a valued group. Feelings of embarrassment, anxiety, guilt and shame occur when there are transgressions of the group expectations or norms,(34, 35) motivating appeasement or reparative actions.(32, 36) Consistent with this,

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10 internalised injunctive norms and important others' subjective norms have been more  
11 strongly related to quitting behaviours than generalised injunctive norms (i.e., perceptions  
12 society disapproves of smoking) or descriptive norms.(20, 21, 24, 26, 28, 29)  
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16 Consistent with contextual theories that suggest norms can spread through ingroup  
17 communication and be responsive to population-level messaging and interventions(37, 38),  
18 there is some evidence media campaigns can influence smoking behaviour indirectly through  
19 social norms. One study found that more emotionally evocative campaigns triggered  
20 discussions(39-42) which conveyed social expectations about smoking, which increased  
21 quitting thoughts and behaviours.(43) Another study found awareness of anti-tobacco  
22 information from campaigns was associated with agreeing there are fewer places where they  
23 feel comfortable smoking.(28) Other experimental studies have found the effect of exposure  
24 to anti-smoking messages can be influenced by the accessibility and salience of social  
25 norms.(44-47)  
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34 Policy changes may also increase quitting through influencing social norms, for example  
35 through the introduction of smoking bans in workplaces and other public places.(21, 25, 31)  
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37 The introduction of tobacco plain packaging with larger new graphic health warning (GHWs)  
38 in Australia led to a reduction in observed smoking and display of cigarette packs at outdoor  
39 dining venues,(48-50), potentially reflecting or leading to greater perceptions of disapproval  
40 of smoking, as was observed among adolescents in France after plain packaging was  
41 introduced.(14) Although there is extensive evidence of the direct impact of tobacco taxes on  
42 cigarette consumption and quitting,(4) we found no studies examining large tax increases and  
43 anti-smoking social norms.  
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51 Set in the Australian state of Victoria over a period (2012-2015) of considerable mass media  
52 campaign variability and policy advancement, this study aimed to examine the influence of  
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10 exposure to different types of mass media campaigns and the introduction of tobacco policies  
11 on smokers' close others' subjective and internalised injunctive norms. Given previous  
12 evidence indicating greater impact of tax increases on lower socio-economic (SES) and  
13 younger smokers and variable evidence surrounding the effects of different types of mass  
14 media campaigns on lower SES smokers,(2, 51) we also aimed to examine SES and age  
15 interactions.  
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## 20 21 **METHODS**

### 22 23 **Study design and methods**

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26 The Victorian Tracking Survey (VTS) was an ongoing cross-sectional telephone survey  
27 conducted from January-2012 to November-2015 among Victorian current smokers or recent  
28 (past year) quitters aged 18-59. Telephone interviews were conducted in English with  
29 participants who reported watching free-to-air commercial television on an average weekday.  
30  
31 A dual-frame probability sampling design was used, with half approached via landline and  
32 half via mobile phone random digit dialling. Data collection was suspended for late  
33 December to early January holiday period. The mean monthly response rate, adjusted for  
34 potentially in-scope people who declined to be formally screened, was 42%.  
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40 Of the 9,008 participants recruited to the study, we excluded recent quitters (n=1,333) and  
41 716 smokers interviewed during months when questions on social norms were not asked  
42 (November and early December in 2012 and 2013). Participants were further excluded if they  
43 had missing information on advertising exposure, social norm outcomes or covariates  
44 (n=310). Our analyses included 6,649 smokers (weighted N=6,658, Supplementary Figure 1).  
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### 50 **Outcome variables: Anti-smoking social norms**

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10 Close others' subjective norms were measured by agreement with "My closest friends and  
11 family members disapprove of my smoking". This measure of disapproval of their smoking  
12 from important others is similar to those used in previous research on subjective norms(28,  
13 52). This measure was found to prospectively predict quitting intentions and smoke limiting  
14 behaviours in our previous study.(24) Internalised injunctive norms were measured by  
15 examining the extent of agreement with "I feel embarrassed to tell people I'm a smoker".  
16 'Embarrassment to tell' was designed to capture the extent to which smokers not only  
17 perceive that others – beyond close friends and family - believe smoking is unacceptable, but  
18 also the extent to which they identify with the social group, given embarrassment would be  
19 unlikely if the person did not identify with or care about the norms of the social group. Our  
20 previous study found baseline agreement with this item prospectively predict quitting  
21 intentions, smoke limiting behaviours and quit attempts at follow-up.(24) Participants rated  
22 these statements on a five-point scale ranging from 'strongly agree' to 'strongly disagree'.  
23 'Strongly agree' or 'agree' responses were combined, and all other responses were coded as  
24 not experiencing that social norm.  
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#### 36 **Predictor variables: Television advertisement exposure**

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39 Data on tobacco control advertisements appearing on television between January-2012 and  
40 December-2015 were obtained from Nielsen/OzTAM Pty Ltd (North Sydney, Australia). The  
41 measure of advertisement exposure was Gross Rating Points (GRPs), reflecting average  
42 potential exposure (see notes to Tables 2 and 3 and monthly sums in Supplementary figure 2  
43 along with policy change dates). These GRPs were configured as continuous measures of (i)  
44 past month exposure, and (ii) exposure from the two to three months immediately prior the past  
45 month. Within these two time periods, GRPs were split into separate sums according to the  
46 predominant types of emotion evoked by each advertisement.  
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As described previously,(53) predominant emotion responses were measured by asking samples of smokers the extent to which each advertisement made them feel hopeful, irritated, sad, fearful, and guilty. Advertisements were categorised as evoking each emotion if  $\geq 45\%$  of smokers agreed the advertisement made them feel the specific emotion.(54) Combined negative emotions advertisements achieved this criterion for sadness, fear and/or guilt, without any one of these emotions being endorsed by  $\geq 10\%$  than the others. Five combined negative emotion ads were narratives from smokers experiencing severe or graphic health effects (e.g., **Terrie's Tips**; **Mick**), while five provided factual detail of severe health effects delivered through confronting and graphic scenes (e.g., **Bronchoscopy**; **16 cancers**). Four advertisements predominantly evoked 'Fear' ( $\geq 10\%$  higher on fear than other emotions) through depicting the way smoking leads to harm (**The Sponge**) or the signs or realisation of an illness, such as seeing blood on a handkerchief or sudden difficulty breathing, (e.g. **Cough**). Seven predominantly evoked 'Sadness' showing the effects of a smokers' illness or death on others (e.g., **Best Intentions**; **Separation**), while none met the criterion for predominant 'Irritation' or 'Guilt'. The 'Hope' evoking advertisement provided help-to-quit messages by depicting quitting strategies or the benefits of quitting for the smoker and their family (e.g., **Never Give Up**, **Giving Up**).

### Predictor variables: Tobacco control policies

For a summary of policy change dates see Supplementary figure 2. The Australian government implemented annual 12.5% tobacco excise increases on 1st December 2013, then on 1st September in 2014 and 2015.(55) Tax increases have been shown to exert most influence immediately and for up to three months while consumers adjust to the new cost.(3) Our measure of the three annual 12.5% tax rises was binary: '1' for the month of change and the three following months (December-2013 to March-2014; September-December in 2014 and 2015); '0' for the other months.

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10 Plain packaging with larger GHWs was implemented in Australia from the 1st October 2012.  
11 New packaging started to appear in September 2012 and roll-out was largely complete by the  
12 mandatory display date of 1st December 2012.(56) The initial impact of plain packaging was  
13 included as a binary variable: '1' represented the implementation period (September-  
14 December 2012) and for three months after mandatory plain packaging (January-March  
15 2013); '0' for other months. This is consistent with other studies showing strong early effects  
16 on quitting helpline calls(57) and intentions and behaviours(15) during the transition and in  
17 the months following the introduction of plain packaging.  
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24 A new series of GHWs started to appear on tobacco packaging from August 2013 and on up  
25 to 80% of packs by November 2013.(56) This corresponded to the period when the 12.5%  
26 annual tax increases were announced and anticipated (1-August-2013 - 30-November-2013).  
27 A binary variable coded August to November 2013 as '1' and the periods before and after as  
28 '0'. The new sets of GHWs were rotated annually and these periods were represented as '1'  
29 for August to November in 2014 and 2015, and '0' for other months.  
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36 During the study period, already extensive smoke-free public areas in Victoria were  
37 expanded to additional outdoor transit and recreation areas (March 2014), and near entrances  
38 of hospitals, education, play and community health centres (April 2015, see Supplementary  
39 figure 2). These outdoor smoke-free expansion policies were represented by the month of the  
40 change and the three-month period following each ban coded as '1' and the period before and  
41 after coded as '0'.  
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#### 47 **Socio-economic and age subgroups**

48 Subgroups for SES were based on where the individual lived (using the Socio-Economic  
49 Index for Areas (SEIFA)-Disadvantage index) and the education level they have achieved  
50 (low education = high school or less; high education = post-high school). The SEIFA-index  
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10 was developed by the Australian Bureau of Statistics based on 2011 Census data of  
11 residential areas, ranking postcodes from high to low disadvantage based on income,  
12 education, occupation and housing conditions in the area.(58) Participants in the lowest 40%  
13 of residential areas in Victoria were categorised as greater disadvantage, and participants in  
14 the top 60% of areas as lower disadvantage. For analysis, low SES was defined as those with  
15 low education who lived in a high disadvantage area, mid SES as those with either low  
16 education who lived in a low disadvantage area or those with high education who lived in a  
17 high disadvantage area, and high SES was defined as those with high education who lived in  
18 a low disadvantage area. Subgroups for age were 18-29 years, 30-44 years and 45-59 years.

#### 26 **Covariates**

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29 Covariates included sex, age, SES, hours per day watching commercial television, region,  
30 extent of non-television-led media (\$AU). Addiction level was based on the Heaviness of  
31 Smoking Index.(59) Low addiction was defined as 0-2 points, moderate addiction as 3-4  
32 points and high addiction as 5-6 points.(59) We also included as a covariate whether the  
33 smoker lived with another smoker in their household.

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38 A measure representing the Average Weekly Income among Victorians(60) was included as  
39 covariate to account for the underlying affordability of tobacco at the time of each tax  
40 increase. Average Weekly Income as a rolling average was collinear with time (month-year),  
41 so a relative change measure was calculated using the month-to-month change in the six-  
42 month rolling average. This measure represents the relative monthly increases and declines in  
43 average earnings over the period (range from -\$0.45 to +\$3.88).

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49 After GRP data were obtained, a few additional tobacco control advertisements were  
50 identified as having broadcast in Victoria. The GRPs for these small number of 'unknown  
51 emotion advertisements' were included as covariates. Month and year of interview was also  
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10 included to account for changes that may affect social norms not captured by other variables  
11 included in the model.

### 14 **Statistical analysis**

16 As per previous research utilising GRP data aggregated to the calendar month,(61, 62)  
17 participants surveyed in the first half of a month (e.g., 1st to 15th May) were assigned  
18 GRPs/policy implementation from the previous calendar month (e.g., April), while those  
19 surveyed in the second half of a month (e.g., 16th to 31st May) were assigned GRPs/policy  
20 implementation from the month of interview (e.g., May). Prior recent advertisement exposure  
21 from the two-to-three months prior to survey date, was also assigned based on this method.  
22 This ensured that smokers' social norms were measured in the same two-week period or after  
23 advertising exposure, and at least two-weeks after each policy was implemented.

24 Data were weighted to account for telephony status (landline or mobile phone), sex and age,  
25 according to estimates from a representative sample of smokers and recent quitters.(63) All  
26 analyses were conducted using Stata V14.1 using weighted data (with the svy command and  
27 'p' weights).

28 Demographic characteristics and proportion exposed to advertisements and policies are  
29 shown in Table 1. Logistic regression analyses examined associations of advertisement  
30 exposure and tobacco control policies with each social norm outcome. The first set of  
31 univariate models included one main predictor variable only per model, and the multivariable  
32 models included all main predictor variables and covariates simultaneously.

33 Consistency of the associations across age and SES subgroups was examined by including  
34 each interaction term (e.g., Predominantly Fear GRPs x SES) separately in four sets of  
35 multivariable models (two outcomes by two subgroup factors (age and SES)), along with the  
36 other predictor variables and covariates. A p-value of <0.01 for the post-model interaction  
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10 test was considered a potentially relevant interaction, given 14 separate multivariable models  
11 were required to test each set of interactions.  
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## 16 **RESULTS**

### 17 **Participant characteristics**

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21 Table 1 shows on average almost two-thirds (63%, monthly proportion ranged from 54% to  
22 72%) perceived disapproval from close family and friends, and 29% (monthly proportion  
23 ranged from 21% to 35%) reported embarrassment about telling others they are a smoker.  
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25 Although there was some overlap between these two social norms outcomes (22.6%  
26 perceiving both and 30.5% perceiving neither), there was a substantial proportion of the  
27 sample that perceived disapproval but not embarrassment (40.7%) and a smaller proportion  
28 that reported embarrassment but not disapproval (6.3%).  
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Table 1. Characteristics of smokers and recent quitters across SES and Age subgroups

	Total sample N(weighted) = 6,658	Lower SES n(weighted) = 2,300	Mid SES n(weighted) = 2,942	Higher SES n(weighted) = 1,416	18 – 29 years n(weighted) = 2,160	30 – 44 years n(weighted) = 2,453	45 – 59 years n(weighted) = 2,045
	%	%	%	%	%	%	%
Male	57.5	56.4	57.7	57.9	63.6	56.6	52.2*
Female	42.5	43.6	42.3	42.1	36.4	43.4	47.9*
Age							
18 – 29 years	32.4	33.2	31.3	33.4*	--	--	--
30 – 44 years	36.9	31.7	35.6	41.6*	--	--	--
45 – 59 years	30.7	35.2	33.1	25.0*	--	--	--
SES							
Lower SES	21.3	--	--	--	21.7	18.3	24.4*
Mid SES	44.2	--	--	--	42.6	42.7	47.6*
Higher SES	34.5	--	--	--	35.6	39.0	28.1*
HSI							
Low addiction	61.8	52.3	60.6	69.4*	73.6	61.4	49.9*
Moderate addiction	31.4	37.5	32.5	26.4*	22.5	32.3	39.8*
High addiction	6.7	10.3	7.0	4.3*	3.9	6.3	10.3*
Single smoker household	57.5	53.4	56.7	61.2*	51.7	60.7	59.9*
Multi-smoker household	42.5	46.6	43.3	38.9*	48.3	39.3	40.1*
Hours spent watching commercial television							
≤ 2 hours/day	66.0	55.7	64.6	74.1*	75.8	67.4	53.8*
>2 to 4 hours/day	25.0	28.9	26.9	20.1*	18.6	24.4	32.3*
>4 hours/day	9.0	15.5	8.6	5.8*	5.6	8.1	13.9*
Regional media region	19.9	37.3	20.0	9.1*	16.0	19.5	24.6*
Metropolitan media region	80.1	62.7	80.0	90.9*	84.0	80.5	75.4*

\* p &lt;.001 for chi-square test of differences between SES and Age sub-groups

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10 **Effects of advertisement exposure and tobacco control policies on anti-smoking social**  
11 **norms**

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14 Past month exposure to fear-evoking advertisements (per 1000 GRPs) was associated with  
15 greater odds of perceiving close others' disapproval (AOR=2.69, 95% Confidence Intervals  
16 (CIs): 1.34, 5.39, Table 2). Past month exposure to sadness- and hope-evoking  
17 advertisements was unrelated, but those exposed to combined negative emotion  
18 advertisements in the past month were less likely to perceive disapproval (AOR=0.61, 95%  
19 CIs: 0.42, 0.87). Exposure to all types of anti-tobacco advertisements in the prior two to three  
20 months was unrelated to perceptions of disapproval.

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23 Those who had recently experienced a 12.5% tax rise had greater odds of perceiving  
24 disapproval (AOR=1.41, 95% CIs: 1.03, 1.94). Correspondingly, those interviewed just after  
25 the announcement and while anticipating the first of the series of 12.5% tax increases (and  
26 when refreshed GHWs were rolled-out) had greater odds of perceiving disapproval  
27 (AOR=1.38, 95% CIs: 1.02, 1.88). Perceived disapproval was not associated with the  
28 expansion of outdoor smoke-free public places, plain packaging implementation, nor with  
29 GHW rotations (Table 2).

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32 Embarrassment about telling others they are a smoker was unrelated to any advertising  
33 exposure or policy announcement or implementation (Table 2). There were no significant  
34 interactions between advertisement exposure and policies and age and SES subgroups on  
35 either perceived disapproval or embarrassment (all interactions p-values  $\geq 0.05$ ;  
36 Supplementary Table 1).  
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Table 2. Odds ratios and 95% confidence intervals for associations of tobacco control advertisement exposure and policy changes with perception of family and friends' disapproval of smoking, and embarrassment to tell people I smoke, N(weighted) = 6,658

	Family and Friends' Disapproval		Embarrassment about being a smoker	
	Univariate models	Multivariate model	Univariate models	Multivariate model
Past month anti-smoking advertisement exposure, per 1000 GRPs+				
Predominantly fear-evoking	1.95 (1.09, 3.50)*	2.69 (1.34, 5.39)**	0.74 (0.41, 1.33)	0.75 (0.37, 1.50)
Predominantly sadness-evoking	1.02 (0.72, 1.43)	0.64 (0.39, 1.05)	1.15 (0.80, 1.65)	1.29 (0.78, 2.14)
Combined negative emotion-evoking	0.94 (0.72, 1.21)	0.61 (0.42, 0.87)**	0.88 (0.67, 1.14)	0.88 (0.61, 1.28)
Predominantly hope-evoking	1.21 (0.87, 1.70)	1.08 (0.69, 1.70)	1.38 (0.99, 1.93)	1.34 (0.86, 2.11)
Prior two-three month anti-smoking advertisement exposure, per 1000 GRPs+				
Predominantly fear-evoking	0.81 (0.57, 1.15)	1.09 (0.67, 1.75)	0.94 (0.65, 1.35)	1.24 (0.75, 2.03)
Predominantly sadness-evoking	1.02 (0.85, 1.23)	1.12 (0.81, 1.54)	0.96 (0.79, 1.17)	1.09 (0.78, 1.52)
Combined negative emotion-evoking	1.11 (0.92, 1.33)	0.91 (0.70, 1.18)	0.99 (0.82, 1.20)	0.94 (0.72, 1.23)
Predominantly hope-evoking	0.92 (0.71, 1.19)	0.77 (0.56, 1.05)	0.90 (0.68, 1.17)	0.74 (0.54, 1.02)
Plain packaging and new GHWs~ Implementation and early post period	1 1.26 (0.95, 1.68)	1 1.24 (0.88, 1.74)	1 1.10 (0.88, 1.38)	1 1.15 (0.82, 1.63)
Announcement and anticipation of tax rises and roll-out of refreshed Health Warnings on packs	1 1.19 (0.95, 1.50)	1 1.38 (1.02, 1.88)*	1 0.89 (0.70, 1.14)	1 0.97 (0.71, 1.34)
Tax rises^^				
No change	1	1	1	1
Per 12.5% tax increase	1.12 (0.94, 1.33)	1.41 (1.03, 1.94)*	1.16 (0.97, 1.38)	1.15 (0.83, 1.58)
Rotation to different set of Health Warnings on packs	1 0.98 (0.84, 1.15)	1 1.24 (0.96, 1.61)	1 1.13 (0.97, 1.33)	1 1.22 (0.94, 1.07)
Outdoor smoking restrictions at public transport, sporting and recreational venues^^	1 0.88 (0.73, 1.07)	1 1.22 (0.94, 1.59)	1 0.88 (0.72, 1.07)	1 0.94 (0.71, 1.25)
Outdoor smoking restrictions at or near education, children/care services and public hospitals^^	1 0.88 (0.72, 1.09)	1 1.34 (0.95, 1.90)	1 1.05 (0.84, 1.30)	1 1.28 (0.89, 1.85)

Covariates					
Time (month-year)		0.99 (0.99, 0.99)**	0.98 (0.97, 0.99)**	1.00 (0.99, 1.00)	0.99 (0.98, 1.01)
Change in average weekly earnings		1.03 (0.99, 1.07)	1.02 (0.95, 1.08)	1.02 (0.98, 1.06)	1.00 (0.94, 1.07)
Media buy region	Regional	1	1	1	1
	Metropolitan	1.27 (1.10, 1.46)**	1.21 (1.03, 1.42)*	1.12 (0.96, 1.30)	0.97 (0.82, 1.14)
Age	18-29 years	1	1	1	1
	30-44 years	1.65 (1.41, 1.91)***	1.66 (1.42, 1.93)***	1.50 (1.27, 1.76)***	1.55 (1.32, 1.83)***
	45-59 years	1.65 (1.43, 1.90)***	1.80 (1.55, 2.10)***	1.30 (1.11, 1.53)**	1.50 (1.28, 1.77)***
SES	Higher SES	1	1	1	1
	Mid SES	0.83 (0.73, 0.95)**	0.88 (0.76, 1.01)	0.73 (0.64, 0.83)***	0.76 (0.66, 0.87)***
	Lower SES	0.73 (0.62, 0.86)***	0.84 (0.71, 1.00)	0.54 (0.45, 0.64)***	0.59 (0.49, 0.71)***
Smokers in household					
Single smoker household		1	1	1	1
Multiple smokers in household		0.57 (0.50, 0.64)***	0.58 (0.51, 0.66)***	0.81 (0.71, 0.92)**	0.85 (0.74, 0.98)*
Hours of TV watching	<2 hours/day	1	1	1	1
	>2-4 hours	1.02 (0.89, 1.16)	0.98 (0.85, 1.13)	0.91 (0.79, 1.04)	0.93 (0.81, 1.07)
	>4 hours	0.75 (0.61, 0.91)**	0.73 (0.59, 0.89)**	0.73 (0.59, 0.90)**	0.79 (0.64, 0.99)*
Addiction level	Low addiction	1	1	1	1
	Moderate addiction	0.83 (0.73, 0.94)**	0.79 (0.69, 0.90)***	0.73 (0.64, 0.84)***	0.72 (0.63, 0.83)***
	High addiction	0.89 (0.70, 1.12)	0.87 (0.68, 1.11)	0.50 (0.38, 0.66)***	0.51 (0.38, 0.67)***
Non-television led media per \$50K		1.00 (0.98, 1.02)	0.98 (0.95, 1.01)	1.01 (0.99, 1.03)	1.00 (0.97, 1.03)
Past month unknown GRPs+		0.59 (0.11, 3.24)	0.45 (0.07, 3.07)	1.59 (0.27, 9.42)	1.39 (0.16, 12.13)
Past two-three month unknown GRPs+		1.07 (0.49, 2.34)	0.91 (0.37, 2.29)	1.04 (0.47, 2.29)	1.16 (0.42, 3.18)

\*\*\*p<.001, \*\*p<.01, \*p<.05. ^Modelled impact of month of change + up to three months post change. ~ GHW=Graphic Health Warnings. + GRPs, gross rating points. GRPs are calculated as the product of the percentage of audience exposed to an advertisement (reach) and the average number of times the audience is exposed (frequency). For example, 1000 GRPs per month represents an average of 100% of the audience within a media market being reached ten times. As detailed elsewhere(53) to create a population-level indicator of predominant emotions evoked by each advertisement, smoker responses were used to indicate whether-or-not each advertisement evoked each emotion in ≥45% of smokers. Advertisements were coded as predominantly fear-evoking, predominantly sadness-evoking or predominantly hope-evoking. Advertisements that evoked multiple negative emotions, but not any specific negative emotion ≥10% higher than other negative emotions, were coded as 'Combined negative emotion-evoking advertisements'.



## DISCUSSION

Our findings indicate past month exposure to fear-evoking advertisements and the anticipation and implementation of large tobacco tax rises was associated with stronger close others' disapproval of their smoking, and that these effects were consistent across age and SES groups. In contrast to the fear-evoking advertisements, recent exposure to combined negative emotion advertisements was associated with reduced close others' disapproval. None of the advertisement types nor policy changes were associated with embarrassment to tell others they are a smoker.

Previous analyses of the same study sample (plus recent quitters) indicated exposure to fear-evoking campaigns in the prior two-three months increased the likelihood of quit attempts.(53) However, in this study only past month exposure increased perceived disapproval. More cumulation of advertisement exposure and time is likely required to help smokers build up to making a quit attempt, whereas campaign effects on changing perceptions of social norms may be more immediate and transient. Similar to previous findings,(20, 25, 28) our study of a sub-set of this sample indicated baseline perceptions of close others' disapproval increased the likelihood of having set a firm date to quit and of engaging in smoking limiting behaviours at follow-up.(24) This set of findings support a potential indirect effect of fear-evoking mass media campaigns on quitting behaviours via anti-smoking social norms, in addition to the direct effects.

These findings also suggest that recent exposure to combined negative emotion advertisements (i.e., evoking sadness, fear and guilt to a similar degree) may reduce perceptions of disapproval, but not feelings of embarrassment, with effects similar across SES and age subgroups. In contrast to the fear-evoking advertisements which tended to depict warning signs which all smokers and their family and friends may dread (e.g., blood on a

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10 handkerchief when coughing, sudden breathlessness), the combined emotion advertisements  
11 were more likely to feature smokers with already obvious and severe physical consequences  
12 (e.g., covering up a tracheotomy, a tumour blocking an airway, requiring an oxygen tank at  
13 all times).(53) Depicting people with these graphic and severe physical consequences may  
14 increase the likelihood of smokers' avoidance of these advertisements by changing the  
15 channel, looking away, or walking out of the room when the advertisement is playing. This  
16 may allow the smoker to avoid the feelings of pressure, disapproval or scrutiny from their  
17 family and friends. However, other research has demonstrated that avoidance of graphic  
18 depictions of the health effects of smoking on tobacco packaging has been positively related  
19 to subsequent quitting motivation and attempts.(64, 65) Potentially, avoidance of these  
20 advertisements may allow smokers to escape the social norms pressures, but not the urgency  
21 to quit. Consistent with this our recent study(53) found exposure to combined negative  
22 emotion advertisements two to three months earlier motivated quit attempts, especially  
23 among lower SES groups. Therefore, the net effect of these combined negative emotion  
24 advertisements on smokers' motivation seems to outweigh any attenuation in effects due to  
25 reducing perceptions of close others' disapproval.  
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38 Although in the expected direction, we found no significant effect of the implementation  
39 period of plain packaging with larger new GHWs on perceptions of disapproval or  
40 embarrassment. It is likely that this policy will exert greater long-term effects on social norms  
41 among younger people via the reduced display and modelling of smoking.(48-50) Pre-post  
42 studies with younger samples that include non-smokers in countries that implement plain  
43 packaging are needed to examine if the social norm effects found in France(14) can also be  
44 detected elsewhere.  
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10 This study is the first to our knowledge to demonstrate a direct association between large  
11 tobacco tax increases and smokers' perceptions of close others' disapproval of their smoking.  
12 This is likely due to tobacco consuming a greater proportion of the household budget leading  
13 to increased financial pressure, which may be subtly perceived by smokers, or overtly  
14 expressed to smokers as disapproval. As these effects were observed up to three months after  
15 implementation it is possible that this pressure may build or be triggered at various points in  
16 the months after the price increase, depending on the capacity of the household to absorb  
17 these increases.  
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24 We also found that during the period between the announcement and the first of these tax  
25 increases, smokers were more likely to perceive close others' disapproval of their smoking.  
26 Previous studies have demonstrated tax rise anticipation effects(66, 67) and this anticipation  
27 may have also increased smokers' perceptions of close others' disapproval of their smoking.  
28 Given the introduction of plain packaging with a new set of GHWs was not associated with  
29 greater perceptions of disapproval, it seems unlikely the simultaneous roll-out of the  
30 refreshed set would have contributed a great deal to the observed association.  
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37 In contrast to previous studies,(21, 25, 31) we found no effect of extensions of outdoor  
38 smoke-free policies on social norms. This may be because comprehensive indoor and partial  
39 outdoor bans had already been implemented, limiting the ability of this patchwork of new  
40 outdoor bans to further reduce the social acceptability of smoking. The longer-term effects of  
41 these policies will likely reinforce the already strong anti-smoking social norms across the  
42 broader Victorian community, as well as contribute to protecting Victorians from exposure to  
43 secondhand smoke.  
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50 This study measured potential population tobacco control advertising exposure via GRPs  
51 rather than individual self-reported exposure, however self-reported advertisement recall has  
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10 been found to closely mirror GRPs levels and as GRP's are an exogenous measure of  
11 exposure they not subject to selective attention like self-reported exposure.(68, 69) One  
12 limitation is that there were only four advertisements predominantly evoking fear. Future  
13 research is required to examine if these findings can be replicated with other examples of  
14 fear-evoking ads. Future real world campaign evaluations and social network studies could  
15 also examine if these effects are found among those within the smoker's social groups, and if  
16 effects persist among groups with greater pro-smoking norms, given some experimental  
17 studies indicate pro-smoking ingroup norms may undermine campaign effects.(44-47) Given  
18 this was an examination of the effects of exposure to real-world advertising and policy  
19 implementation occurring across an entire state, it was not possible to have an unexposed  
20 comparison group, limiting our ability to draw causal conclusions. However, we did adjust  
21 for demographic, addiction, location, media use and other potential contextual confounders  
22 increasing confidence in these findings.

### 33 **Conclusions**

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35 This is the first study to indicate large tobacco tax increases and fear-evoking campaigns may  
36 be associated with the subjective social norms previously found to predict greater quitting  
37 intentions and behaviours. We also found that embarrassment about telling others you are a  
38 smoker was not associated with any of the advertisements or policies examined. Changing  
39 perceptions of close others' social norms may be an important pathway through which  
40 emotive tobacco control campaigns and policies can help support smokers to change their  
41 behaviour.  
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15  
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17 the statistical analysis; SD and DS interpreted the results and wrote the manuscript; EB, MB  
18 and MW contributed to interpretation of the results and critical revision of the manuscript.  
19 MB and SD led the study design and contributed to questionnaire development for the  
20 Victorian Tracking Survey.  
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25 **Ethics approval:** The study was approved by the Human Research Ethics Committee of  
26 Cancer Council Victoria (HREC 1104). The data were analysed anonymously.  
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29 **Data sharing:** No additional data are available.  
30

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32

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### **What this paper adds**

What is already known on this subject:

- Greater perceptions of close others' disapproval of smoking (subjective norms) and embarrassment about smoking (internalised injunctive norms) leads to greater quitting motivation, intentions and cessation behaviours.

What important gaps in knowledge exist on this topic:

- There is relatively little research examining which types of tobacco control campaigns and policies influence these anti-smoking social norms.

What this study adds:

- This is the first study to demonstrate that the announcement and implementation of large tobacco tax rises and recent exposure to fear-evoking campaigns can increase perceptions of close others' disapproval of smoking.

**REFERENCES**

1. National Cancer Institute. The role of the media in promoting and reducing tobacco use. Tobacco Control Monograph No 19. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health, National Cancer Institute, 2008 June. Report No.: NIH Pub No 07-6242.
2. Durkin S, Brennan E, Wakefield M. Mass media campaigns to promote smoking cessation among adults: An integrative review. *Tob Control*. 2012;21:127-38.
3. Dunlop SM, Cotter TF, Perez DA. Impact of the 2010 tobacco tax increase in Australia on short-term smoking cessation: a continuous tracking survey. *Med J Aust*. 2011;195(8):469-72.
4. World Health Organisation (WHO). WHO Report on the Global Tobacco Epidemic: Raising taxes on Tobacco. Geneva, Switzerland: WHO, 2015.
5. Chaloupka FJ, Yurekli A, Fong GT. Tobacco taxes as a tobacco control strategy. *Tob Control*. 2012;21(2):172-80.
6. International Agency for Research on Cancer. Effectiveness of tax and price policies for tobacco control. Lyon, France: IARC, 2011 Contract No.: Vol.14.
7. Wakefield M, Coomber K, Durkin SJ, Scollo M, Bayly M, Spittal MJ, et al. Time series analysis of the impact of tobacco control policies on smoking prevalence among Australian adults, 2001–2011. *Bulletin of the World Health Organization*. 2014;92:413-22.
8. Grace C, Purcell K, Scollo M, Tumini V. Chapter 15 Smokefree environments. In: Scollo M, Winstanley M, editors. *Tobacco in Australia: Facts and issues*. Melbourne, Australia: Cancer Council Victoria; 2016.

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9. Hopkins DP, Razi S, Leeks KD, Priya Kalra G, Chattopadhyay SK, Soler RE. Smokefree policies to reduce tobacco use. A systematic review. *Am J Prev Med.* 2010;38(2 Suppl):S275-89.
  10. Borland R, Yong HH, Wilson N, Fong GT, Hammond D, Cummings KM, et al. How reactions to cigarette packet health warnings influence quitting: findings from the ITC Four-Country survey. *Addiction.* 2009;104(4):669-75.
  11. Yong H-H, Borland R, Thrasher JF, Thompson ME, Nagelhout GE, Fong GT, et al. Mediation pathways of the impact of cigarette warning labels on quit attempts. *Health Psychology.* 2014;Online First.
  12. Cho YJ, Thrasher J, Yong H-H, Salem Szklo A, O'Connor RJ, Bansal-Travers M, et al. Path analysis of warning label effects on negative emotions and quit attempts: A longitudinal study of smokers in Australia, Canada, Mexico, and the US. *Social Science & Medicine.* 2018;197:226-34.
  13. Noar SM, Francis DB, Bridges C, Sontag JM, Ribisl KM, Brewer NT. The impact of strengthening cigarette pack warnings: Systematic review of longitudinal observational studies. *Social Science & Medicine.* 2016;164:118-29.
  14. El-Khoury Lesueur F, Bolze C, Gomajee R, White V, Melchior M. Plain tobacco packaging, increased graphic health warnings and adolescents' perceptions and initiation of smoking: DePICT, a French nationwide study. *Tob Control.* 2018.
  15. Durkin S, Brennan E, Coomber K, Zacher M, Scollo M, Wakefield M. Short-term changes in quitting-related cognitions and behaviours after the implementation of plain packaging with larger health warnings: findings from a national cohort study with Australian adult smokers. *Tob Control.* 2015;24(Suppl 2):ii26-ii32.
  16. Hill D, Dixon H. Achieving behavioural changes in individuals and populations. In: Elwood JM, Sutcliffe SB, editors. *Cancer Control* 2010. p. 43-61.



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17. Wakefield M, Loken B, Hornik R. Use of mass media campaigns to change health behaviour. *Lancet*. 2010;376(9748):1261-71.
  18. Yanovitzky I, Stryker J. Mass media social norms, and health promotion efforts: A longitudinal study of media effects on youth binge drinking. *Communication Research*. 2001;28(2):208-39.
  19. Hornik R. Exposure: Theory and evidence about all the ways it matters. *SMQ*. 2002;8(3):31-7.
  20. Hosking W, Borland R, Yong HH, Fong G, Zanna M, Laux F, et al. The effects of smoking norms and attitudes on quitting intentions in Malaysia, Thailand and four Western nations: A cross-cultural comparison. *Psychology & Health*. 2009;24(1):95 - 107.
  21. Orbell S, Lidieth P, Henderson CJ, Geeraert N, Uller C, Uskul AK, et al. Social-cognitive beliefs, alcohol, and tobacco use: A prospective community study of change following a ban on smoking in public places. *Health Psychology*. 2009;28(6):753-61.
  22. Lee H, Paek HJ. Roles of guilt and culture in normative influence: testing moderated mediation in the anti-secondhand smoking context. *Psychol Health Med*. 2014;19(1):14-23.
  23. Widome R, Hammett P, Joseph AM, Burgess DJ, Thomas JL, Saul J, et al. A cross-sectional study of the relationship of proximal smoking environments and cessation history, plans, and self-efficacy among low-income smokers. *Journal of Smoking Cessation*. 2019:1-10.
  24. Schoenaker DAJM, Brennan E, Wakefield MA, Durkin SJ. Anti-smoking social norms are associated with increased cessation behaviours among lower and higher socioeconomic status smokers: a population-based cohort study. *PloS one*. 2018;13(12):e0208950.
  25. Hammond D, Fong GT, Zanna MP, Thrasher JF, Borland R. Tobacco denormalization and industry beliefs among smokers from four countries. *Am J Prev Med*. 2006;31(3):225-32.

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26. Hughes JR, Naud S, Fingar JR, Callas PW, Solomon LJ. Do environmental cues prompt attempts to stop smoking? A prospective natural history study. *Drug and alcohol dependence*. 2015;154:146-51.
27. Sorensen G, Emmons K, Stoddard AM, Linnan L, Avrunin J. Do social influences contribute to occupational differences in quitting smoking and attitudes toward quitting? *American Journal of Health Promotion*. 2002;16(3):135-41.
28. Rennen E, Nagelhout GE, van den Putte B, Janssen E, Mons U, Guignard R, et al. Associations between tobacco control policy awareness, social acceptability of smoking and smoking cessation. Findings from the International Tobacco Control (ITC) Europe Surveys. *Health Educ Res*. 2014;29(1):72-82.
29. Kirchner TR, Shiffman S, Wileyto EP. Relapse dynamics during smoking cessation: recurrent abstinence violation effects and lapse-relapse progression. *J Abnorm Psychol*. 2012;121(1):187-97.
30. Lee WB, Fong GT, Dewhirst T, Kennedy RD, Yong H-H, Borland R, et al. Social marketing in Malaysia: cognitive, affective, and normative mediators of the TAK NAK antismoking advertising campaign. *Journal of Health Communication*. 2015:1-11.
31. Brown A, Moodie C, Hastings G. A longitudinal study of policy effect (smoke-free legislation) on smoking norms: ITC Scotland/United Kingdom. *Nicotine Tob Res*. 2009;11(8):924-32.
32. Chung A, Rimal RN. Social Norms: A Review. *Review of Communication Research*. 2016;4:1-28.
33. Reynolds KJ, Subašić E, Tindall K. The problem of behaviour change: from social norms to an ingroup focus. *Social and Personality Psychology Compass*. 2015;9(1):45-56.
34. Bicchieri C. *The Grammar of Society: The nature and dynamics of social norms*. Cambridge: Cambridge University Press; 2006.

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9  
10 35. Elster J. Rationality, emotions, and social norms. *Synthese*. 1994;98(1):21-49.
- 11 36. Keltner D, Buswell BN. Embarrassment: Its distinct form and appeasement functions.  
12 *Psychol Bull*. 1997;122(3):250-70.
- 13 37. Rimal RN, Real K. How behaviors are influenced by perceived norms: A test of the  
14 theory of normative social behavior. *Communication Research*. 2005;32(3):389-414.
- 15 38. Lapinski MK, Rimal RN. An explication of social norms. *Communication Theory*.  
16 2005;15(2):127-47.
- 17 39. Brennan E, Durkin SJ, Wakefield MA, Kashima Y. Talking about antismoking  
18 campaigns: what do smokers talk about, and how does talk influence campaign effectiveness?  
19 *Journal of Health Communication*. 2016;21(1):33-45.
- 20 40. Dunlop SM, Kashima Y, Wakefield M. Predictors and consequences of conversations  
21 about health promoting media messages. *Communication Monographs*. 2010;77(4):518-39.
- 22 41. Dunlop S, Wakefield M, Kashima Y. The contribution of anti-smoking advertising to  
23 quitting: Intra- and inter-personal processes. *Journal of Health Communication*.  
24 2008;13(2):250-66.
- 25 42. Southwell BG, Yzer MC. When (and why) interpersonal talk matters for campaigns.  
26 *Communication Theory*. 2009;19:1-8.
- 27 43. Dunlop SM, Cotter T, Perez D. When your smoking is not just about you: Anti-  
28 smoking advertising, interpersonal pressure and quitting outcomes. *Journal of Health*  
29 *Communication*. 2014;19(1):41-56.
- 30 44. Rhodes N, Roskos-Ewoldsen DR, Edison A, Bradford MB. Attitude and Norm  
31 Accessibility Affect Processing of Anti-Smoking Messages. *Health Psychology*.  
32 2008;27(Suppl. 3):S224-S32.
- 33  
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10 45. Falomir JM, Invernizzi F. The role of social influence and smoker identity in  
11 resistance to smoking cessation. *Swiss Journal of Psychology / Schweizerische Zeitschrift für*  
12 *Psychologie / Revue Suisse de Psychologie*. 1999;58(2):73-84.  
13  
14  
15 46. Wong NCH, Nisbett GS, Harvell LA. Smoking Is So Ew!: College smokers' reactions  
16 to health- versus social-focused antismoking threat Messages. *Health Commun*.  
17 2017;32(4):451-60.  
18  
19  
20 47. Martin IM, Kamins MA. An application of terror management theory in the design of  
21 social and health-related anti-smoking appeals. *Journal of Consumer Behaviour*.  
22 2010;9(3):172-90.  
23  
24  
25 48. Zacher M, Bayly M, Brennan E, Dono J, Miller C, Durkin S, et al. Personal pack  
26 display and active smoking at outdoor café strips: assessing the impact of plain packaging 1  
27 year postimplementation. *Tob Control*. 2015;24(Suppl 2):ii94-ii7.  
28  
29  
30 49. Zacher M, Bayly M, Brennan E, Dono J, Miller C, Durkin S, et al. Personal tobacco  
31 pack display before and after the introduction of plain packaging with larger pictorial health  
32 warnings in Australia: an observational study of outdoor café strips. *Addiction*.  
33 2014;109(4):653-62.  
34  
35  
36 50. Brennan E, Bayly M, Scollo M, Zacher M, Wakefield M. Observed smoking and  
37 tobacco pack display in Australian outdoor cafés two years after implementation of plain  
38 packaging. *Eur J Public Health*. 2018;28(4):702-7.  
39  
40  
41 51. Niederdeppe J, Fiore MC, Baker TB, Smith SS. Smoking-cessation media campaigns  
42 and their effectiveness among socioeconomically advantaged and disadvantaged populations.  
43 *Am J Public Health*. 2008;98(5):916-24.  
44  
45  
46 52. Hosking W, Borland R, Yong HH, Fong G, Zanna M, Laux F, et al. The effects of  
47 smoking norms and attitudes on quitting intentions in Malaysia, Thailand and four Western  
48 nations: a cross-cultural comparison. *Psychol Health*. 2009;24(1):95-107.  
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10 53. Durkin S, Bayly M, Brennan E, Biener L, Wakefield M. Fear, Sadness and Hope:  
11 Which Emotions Maximize Impact of Anti-Tobacco Mass Media Advertisements among  
12 Lower and Higher SES Groups? *J Health Commun.* 2018;23(5):445-61.  
13  
14  
15 54. Durkin S, Bayly M, Brennan E, Biener L, Wakefield M. Fear, sadness and hope:  
16 which emotions maximise impact of anti-tobacco mass media advertisements among lower  
17 and higher SES groups? *Journal of Health Communication.* 2018;23(5):445-61.  
18  
19  
20 55. Scollo M, Bayly M. Tobacco in Australia: Facts and Issues.13.2 Tobacco taxes in  
21 Australia.Melbourne, Australia. Cancer Council Victoria; 2017; Available from:  
22 <http://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-2-tobacco-taxes-in-australia>.  
23  
24  
25 56. Scollo M, Lindorff K, Coomber K, Bayly M, Wakefield M. Standardised packaging  
26 and new enlarged graphic health warnings for tobacco products in Australia -- legislative  
27 requirements and implementation of the Tobacco Plain Packaging Act 2011 and the  
28 Competition and Consumer (Tobacco) Information Standard, 2011. *Tob Control.*  
29 2015;24(Supplement 2):ii9-ii16.  
30  
31  
32 57. Young JM, Stacey I, Dobbins TA, Dunlop S, Dessaix AL, Currow DC. Association  
33 between tobacco plain packaging and Quitline calls: a population-based, interrupted time-  
34 series analysis. *Med J Aust.* 2014;200(1):29-32.  
35  
36  
37 58. Australian Bureau of Statistics. 2033.0.55.001 - Socio-Economic Indexes for Areas  
38 (SEIFA) 2011: Technical Paper. Canberra, Australia: Australian Bureau of Statistics, 2013.  
39  
40  
41 59. Heatherton TF, Kozlowski LT, Frecker RC, Rickert W, Robinson J. Measuring the  
42 heaviness of smoking: using self-reported time to the first cigarette of the day and number of  
43 cigarettes smoked per day. *British Journal of Addiction.* 1989;84(7):791-9.  
44  
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46 60. Average Weekly Earnings, Australia [Internet]. Commonwealth of Australia. 2018.  
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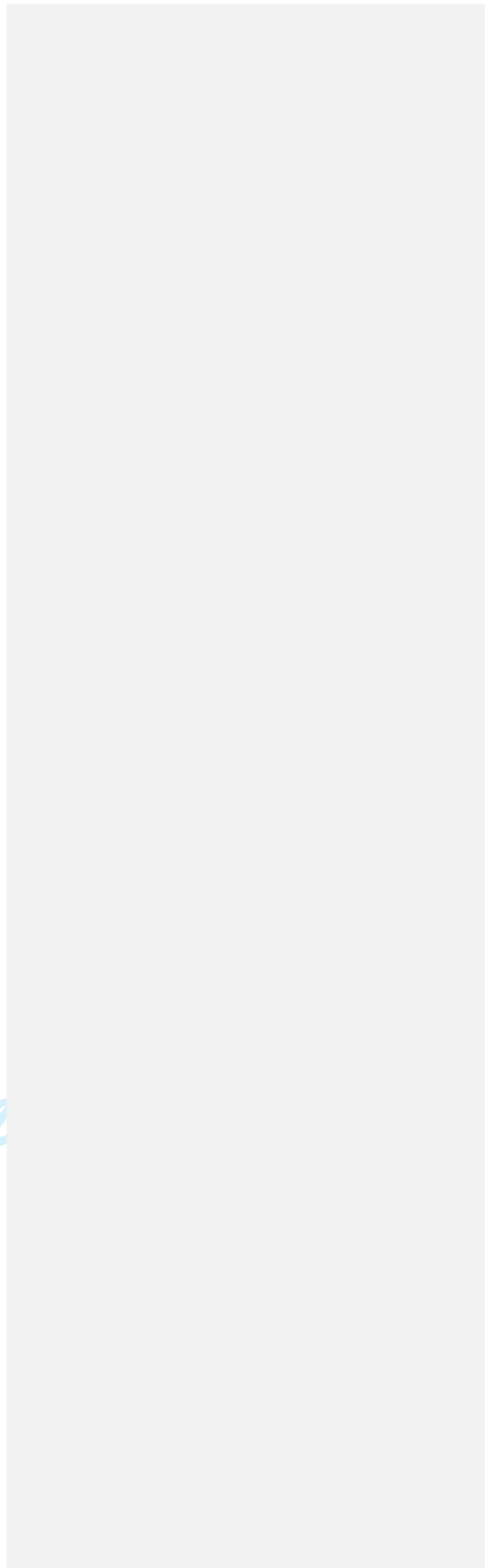
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61. Wakefield M, Spittal MJ, Yong HH, Durkin SJ, Borland R. Effects of mass media campaign exposure intensity and durability on quit attempts in a population-based cohort study. *Health Educ Res.* 2011;26(6):988-97.
62. Wakefield M, Bowe SJ, Durkin SJ, Yong H, Spittal MJ, Simpson JA, et al. Does tobacco control mass media campaign exposure prevent relapse among recent quitters? *Nicotine Tob Res.* 2013;15(2):385-92.
63. Hayes L, Durkin S, Bain E, Wakefield M. Smoking prevalence and consumption in Victoria: key findings from the Victorian Smoking and Health population surveys. CBRC Research Paper Series No.47. Melbourne, Australia: Centre for Behavioural Research in Cancer, Cancer Council of Victoria, Prepared for: Quit Victoria; 2016 December. Report No.
64. Yong HH, Borland R, Thrasher JF, Thompson ME, Nagelhout GE, Fong GT, et al. Mediation pathways of the impact of cigarette warning labels on quit attempts. *Health Psychology.* 2014;33(11):1410-20.
65. Brewer NT, Hall MG, Noar SM. Pictorial cigarette pack warnings increase quitting: A comment on Kok et al. *Health Psychology Review.* 2018;12(2):129-32.
66. Harwell TS, Lee L, Haugland C, Wilson SM, Campbell SL, Holzman GS, et al. Utilization of a tobacco quit line prior to and after a tobacco tax increase. *Journal of Public Health Management and Practice.* 2007;13(6):637-41.
67. Li J, Newcombe R, Guiney H, Walton D. Impact on Smoking Behavior of the New Zealand Annual Increase in Tobacco Tax: Data for the Fifth and Sixth Year of Increases. *Nicotine Tob Res.* 2017;19(12):1491-8.
68. Biener L, Wakefield M, Shiner CM, Siegel M. How broadcast volume and emotional content affect youth recall of anti-tobacco advertising. *Am J Prev Med.* 2008;35(1):14-9.

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10 69. Southwell BG, Barmada CH, Hornik RC, Maklan DM. Can we measure encoded  
11 exposure? Validation evidence from a national campaign. *Journal of Health Communication*.  
12 2002;7(5):445-53.  
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**Supplementary Figure 1.** Flow diagram of unweighted participants included and excluded for the current analysis.

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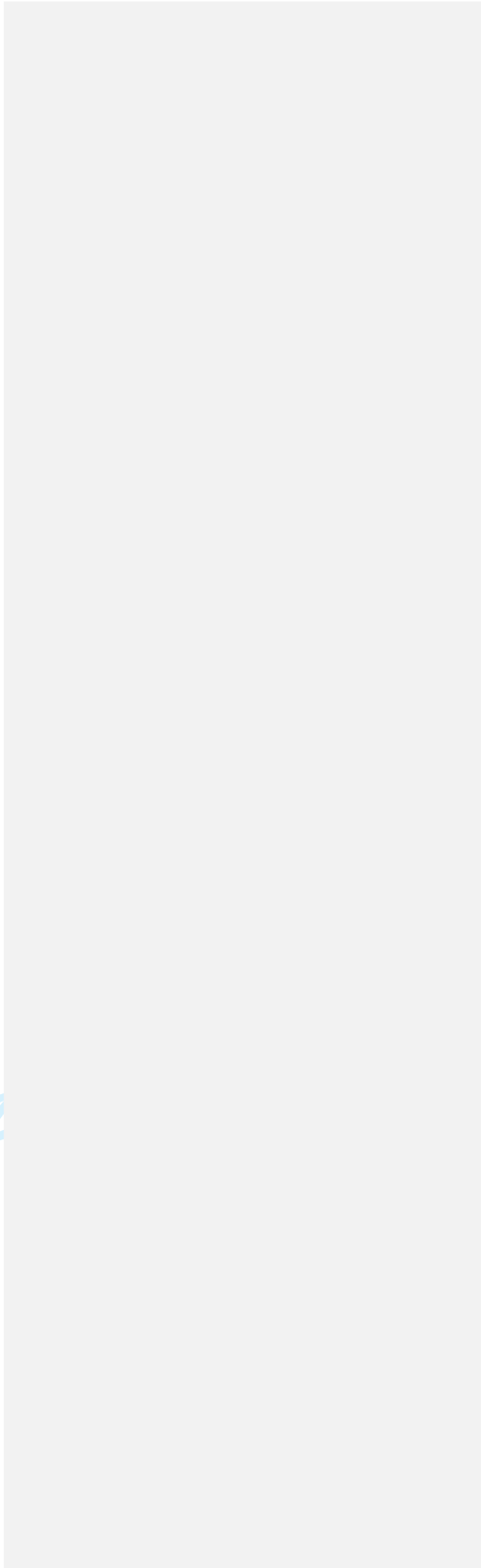




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**Supplementary Figure 2.** Quarterly sums of gross ratings points (GRPs), timing of tax rises indicated by increases in the rate of excise duty on cigarettes in \$2012, and dates of policy change implementation from 2012 to 2015.

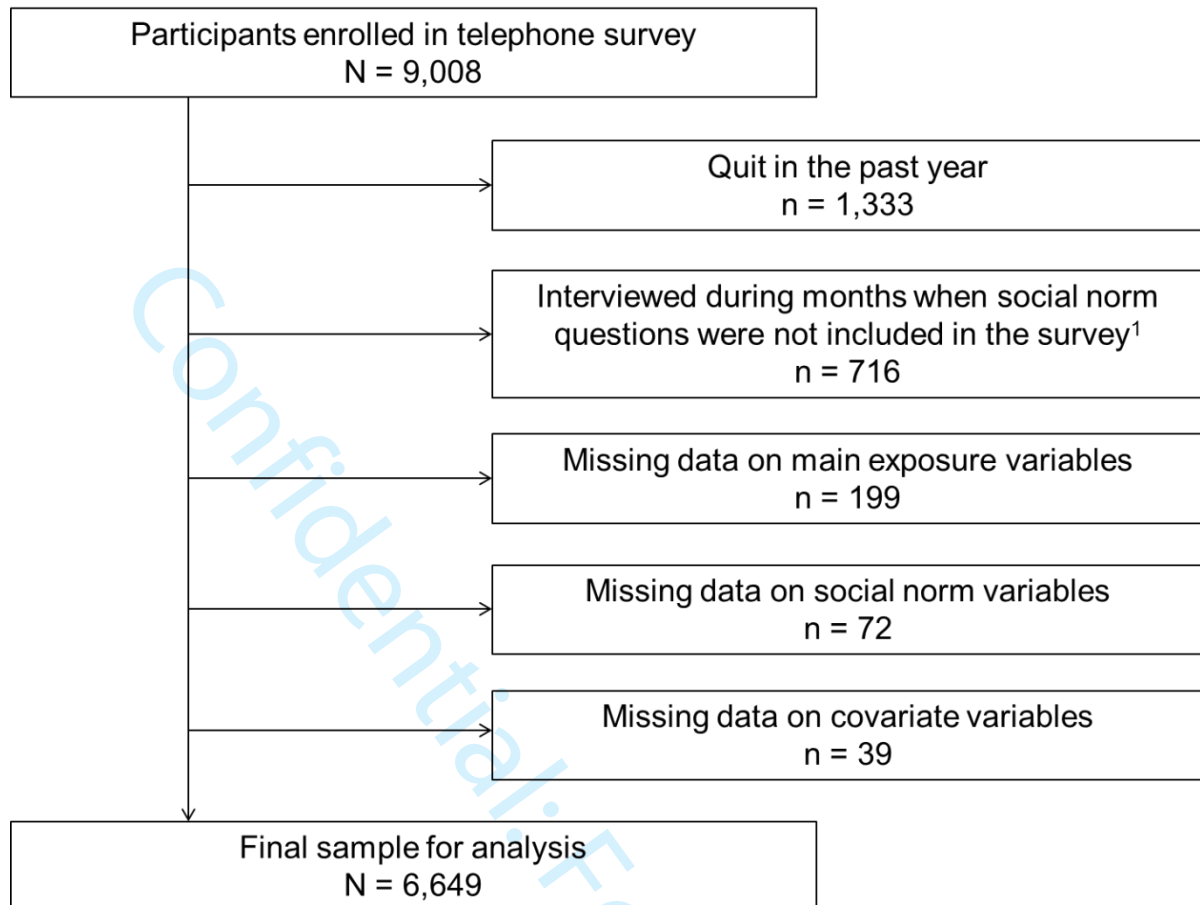
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Supplementary Table 1. Interaction terms for SES and age with main predictors for associations with perception of family and friends' disapproval of smoking, and embarrassment about being a smoker, N(weighted) = 6,658

	Family and Friends' Disapproval				Embarrassment about being a smoker			
	SES interaction F-value	p-value	Age interaction F-value	p-value	SES interaction F-value	p-value	Age interaction F-value	p-value
Past month anti-smoking advertisement exposure, per 1000 GRPs+								
Predominantly fear-evoking	0.00	.998	0.96	0.382	0.36	0.699	1.31	0.270
Predominantly sadness-evoking	2.09	.123	0.66	0.518	1.49	0.226	0.96	0.382
Combined negative emotion-evoking	0.48	.620	0.04	0.964	0.15	0.862	0.06	0.939
Predominantly hope-evoking	0.96	.384	0.47	0.624	0.27	0.761	0.60	0.547
Past two-three month anti-smoking advertisement exposure, per 1000 GRPs+								
Predominantly fear-evoking	2.44	0.087	0.11	0.900	0.06	0.945	1.28	0.278
Predominantly sadness-evoking	0.84	0.432	1.64	0.195	0.24	0.790	2.26	0.104
Combined negative emotion-evoking	1.40	0.247	0.72	0.489	0.61	0.541	0.77	0.463
Predominantly hope-evoking	1.69	0.186	2.11	0.122	2.05	0.130	0.65	0.524
Plain packaging and new GHWs~	0.41	0.664	0.33	0.719	0.53	0.589	1.53	0.218
Announcement and anticipation of tax rises and roll-out of refreshed GHWs on packs	1.04	0.353	0.26	0.771	0.87	0.419	0.11	0.894
Tax rises^^	0.41	0.664	0.59	0.553	0.06	0.946	0.03	0.970
Rotation to different set of GHWs on packs	0.16	0.852	1.03	0.358	0.16	0.850	1.07	0.345
Outdoor smoking restrictions at public transport, sporting and recreational venues^^	1.14	0.320	0.06	0.943	1.29	0.276	0.02	0.979
Outdoor smoking restrictions at or near education, children/care services and public hospitals^^	1.09	0.338	2.51	0.081	1.24	0.289	0.69	0.499

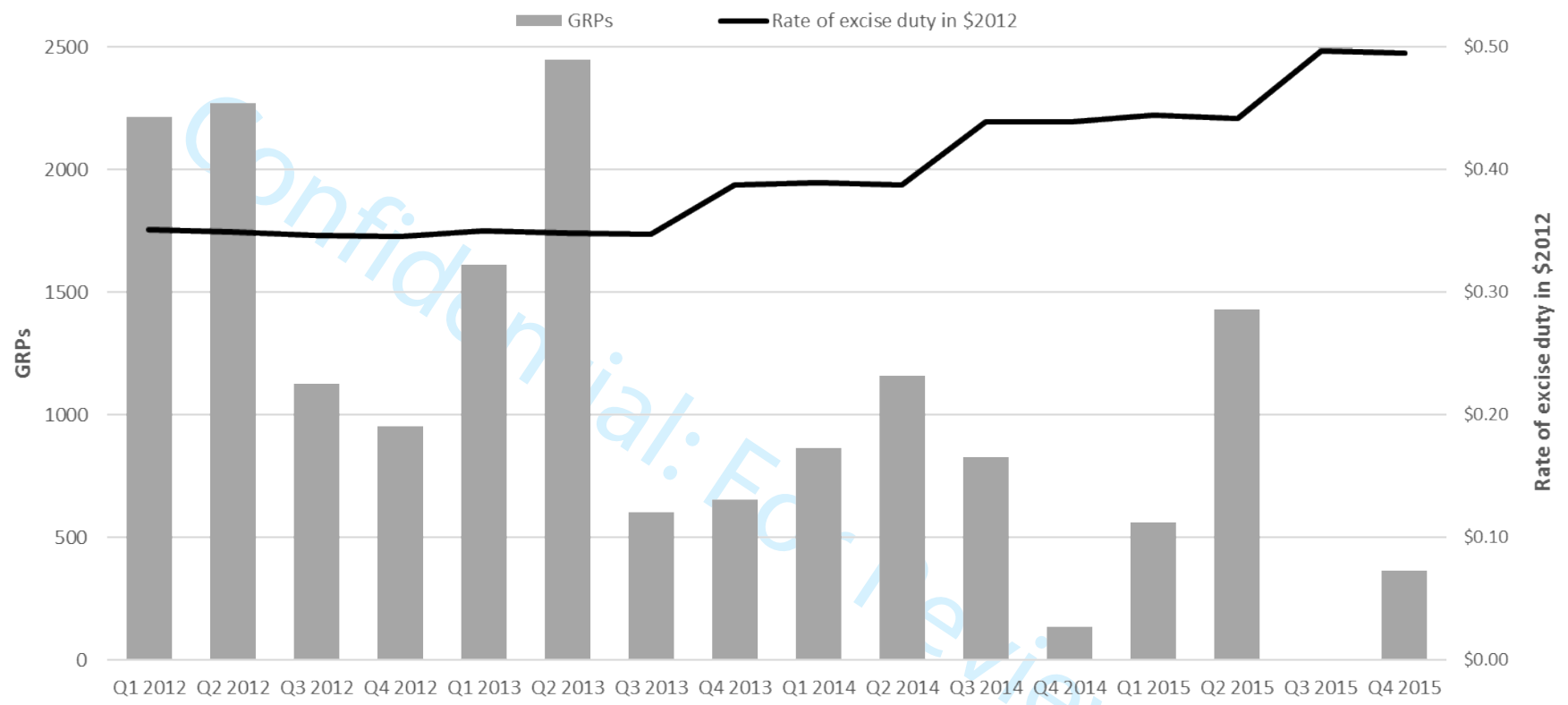
~ GHW=Graphic Health Warnings. + GRPs, gross rating points. ^^Month of change + three months post change.  
 Covariates: age, sex, socioeconomic status, hours spent watching television per day, addiction level, other smokers in household, past month and past 2-3 months of unknown emotion advertisement exposure, non-TV led media costs, media region, and month and year of interview.



33 **Supplementary Figure 1.** Flow diagram of unweighted participants included and excluded  
34 for the current analysis.

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37 <sup>1</sup> Social norm questions were not included during November and December in 2012 and 2013  
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**Sep-Dec 2012**  
Plain packaging and new larger GHWs introduced

**Dec 2012**  
Smoking ban on Victorian beaches

**Dec 2013**  
12.5% tobacco excise/duty increase

**Aug-Nov 2014**  
New set of GHWs rotated in; Announcement of annual 12.5% tobacco excise/duty increases

**Mar 2014**  
Smoking ban in outdoor transport and recreation areas

**Dec 2014**  
12.5% tobacco excise/duty increase

**Aug-Nov 2014**  
Annual GHW rotation

**Apr 2015**  
Smoking ban within 4 metres of entrances to education and play centres, public hospitals and community centres

**Dec 2014**  
12.5% tobacco excise/duty increase

**Aug-Nov 2015**  
Annual GHW rotation