Which types of televised anti-tobacco campaigns prompt more quitline calls from disadvantaged groups?

Sarah J. Durkin¹*, Melanie A. Wakefield¹ and Matthew J. Spittal²
¹Centre for Behavioural Research in Cancer, The Cancer Council Victoria, 1 Rathdowne Street, Carlton, Victoria 3053, Australia and ²Centre for Health Policy, Programs and Economics, Melbourne School of Population Health, The University of Melbourne, Carlton, Victoria 3010, Australia
*Correspondence to: S. J. Durkin. E-mail: sarah.durkin@cancervic.org.au
Received on September 6, 2010; accepted on May 26, 2011

Abstract
To examine the efficacy of different types of mass media ads in driving lower socio-economic smokers (SES) to utilize quitlines. This study collected all 33719 calls to the Victorian quitline in Australia over a 2-year period. Negative binomial regressions examined the relationship between weekly levels of exposure to different types of anti-smoking ads and quitline calls, after adjusting for covariates. Interaction terms were added to determine whether relationships differed by SES. In total, smokers were exposed 88.39 times to anti-smoking ads over the 2-year period, as estimated by target audience ratings points. Higher emotion narrative ad exposure had the strongest association with quitline calls, increasing call rates by 13% for every additional ad exposure per week (per 100 points, rate ratio = 1.132, P = 0.001). Substantially, greater increases in calls to quitline from lower SES groups were observed when higher emotion narrative ads were on air compared with when other ad types were on air, and this advantage was not as strong among higher SES groups. Airing higher emotion narrative anti-smoking ads may contribute to reducing, but not eliminating, socio-economic disparities in calls to the quitline through maximizing the responses of the lower SES smokers.

Introduction
It is vital that effective ways of increasing quit rates among disadvantaged groups are identified as these groups have the highest smoking rates and shoulder the greatest burden of disease from tobacco use [1–3]. Research clearly shows mass media anti-smoking campaigns prompt help seeking behaviours such as calling the quitline [4–9], increase quitting intentions, increase cessation activity and reduce population smoking rates [10]. Telephone quitlines can improve long-term cessation rates [11], and a recent cohort study found low-income smokers using the quitline achieved cessation outcomes that were comparable to other studies of mainstream smokers [12].

Despite this, very little is known about the efficacy of mass media campaigns in driving lower socio-economic smokers (SES) to utilize quitlines. One recent study that examined this issue found the pattern of increase in call rates associated with anti-smoking ad exposure was equal across SES groups [13]. This is consistent with a recent review of the effects of campaigns on low SES smokers, which found comparable effects for many wide reaching anti-smoking campaigns on quitting rates and smoking prevalence across different SES groups [14]. This research indicates most well funded anti-smoking campaigns are neither likely to increase nor redress existing disparities in quitline call rates, quit rates or smoking prevalence.
distinguish between different styles of campaign messages.

A comprehensive review of the effectiveness of a wide variety of anti-smoking campaigns reveals some are more effective than others [10]. Forced exposure ad rating and population-based studies have consistently shown that anti-smoking ads that use graphic imagery and personal stories of the health effects of smoking to generate high levels of negative emotion are associated with greater recall and influence on smoking attitudes and intentions [15–20]. To date, only two studies have specifically examined the impact of different types of ads across SES groups [21, 22]. Examining a cohort of adult smokers over 1 year, Niederdeppe et al. [21] found baseline recall of ‘how to quit’ ads was related to higher quit attempts among higher educated but not lower educated populations. Durkin et al. [22] followed almost 1500 adult smokers in Massachusetts over 2 years and found for those in low SES and mid SES groups, quitting at 2-year follow-up was associated with greater exposure to highly emotional and personal story-based ads.

Few studies have examined the effects of different types of messages in driving quitline calls. Carroll and Rock [9] found airing a combination of ads modelling a smoker calling the quitline with ads graphically depicting health effects of smoking led to greater increases in calls than airing graphic ads alone. These authors also found that the ad with new information (eye) was more efficient than the ad that built upon existing information about lung cancer (tar) from a previously aired ad (lung). Mosbaek et al. [4] found real life testimonials by people who have lost family members to tobacco, and ads that deal practically with how to quit were most effective at generating quitline calls. Wilson et al. [7] found the most effective ad among indigenous Maori smokers was the strong graphic health effects ad ‘Every Cigarette’, while a second hand smoke ad was the least successful. Further investigation of the impact of diverse styles of anti-smoking ads across SES groups is needed to determine if some anti-smoking messages prompt more quitline calls from disadvantaged groups.

In examining the relationship between anti-smoking ads and quitline calls, previous studies have had limited ability to control for other factors that may drive smokers to call a quitline. Factors that have been found to be related to increased quitline calls in Australia include the New Year period, World No Tobacco Day and the introduction of new graphic health warnings (GHW) on cigarette packs from March 2006, which included the prominent display of the Quitline number (131848) on packs [23]. The introduction of smokefree legislation in Victoria in July 2007 is also likely to have influenced call rates, with a previous study from New Zealand [24] demonstrating increased calls as a result. Advertising research also indicates that ads wear out over time and with repeat airings [25], with some evidence that newly created ads may drive greater quitline calls [9]. The addition of these covariates may help clarify previous findings.

Based on previous research [4–9], our first hypothesis is that greater anti-smoking ad exposure will be associated with increased rates of calls to the quitline. Consistent with Siahpush et al. [13], our second hypothesis is that call rates will increase to the same extent across different SES groups in response to overall ad exposure. Consistent with Mosbaek et al. [4] and findings from forced exposure and population studies [10], our third hypothesis is that the relationship between call rates and advertising exposure will be stronger for higher emotion and high narrative ads than for those ads that do not contain either of these elements. Our fourth hypothesis, consistent with previous findings [22], is that greater increases in quitline calls from low SES smokers will be observed after exposure to highly emotionally evocative and story-based ads compared with exposure to ads that evoke less emotion and do not use personal stories to convey the message. Although how to quit messages have previously been found to be more effective among higher SES groups [21], none of these types of ads were aired in this jurisdiction during the study period, and so we could not explore the effects of these types of ads on quitline calls from different SES groups.
Materials and methods

This study analysed calls to the quitline in the Australian state of Victoria over 107 weeks (10 December 2006 to 31 December 2008) during which 13 ads designed to motivate smokers to quit were aired and 33,719 quitline calls were received. All ads aired in Victoria over this period ended with the quitline number displayed in the end frame. A second hand smoke ad (Smokefree Homes and Cars ad) was aired for 4 weeks in August 2007, but this ad was excluded as the ad did not aim to motivate quitting and did not include the quitline number in the end frame.

Ad categorizations

Consistent with previous research methods employed by Biener et al. [19, 26, 27], we categorized the ads aired over the study period into lower versus higher emotion and into those that contained personal story lines or narratives, from those that did not, based on an preliminary ad rating study. In this ad rating study, daily smokers were sourced through a database of research participants who had previously agreed to be contacted about future research. The selection criteria in this ad rating study also reflected the target audience of anti-smoking campaigns in Victoria: 50% were female; the mean age was 30.9 years (SD = 8.6 years) and 54% lived in areas with high or moderate levels of socio-economic disadvantage. Two sets of 50 adult smokers rated 10 ads each (making a series of 20 ads rated by 100 smokers) [28]. Ads were rated on the extent to which they evoked seven negative emotions on a scale from 0 ‘none of this feeling’ to 4 ‘a great deal of this feeling’ (anxiety, shame, disgust, fear, guilt, sadness and discomfort, $\alpha = 0.92$) and the extent to which they were perceived to be narrative using three items on a scale of 1 ‘strong disagree’ to 5 ‘strongly agree’ (contained a storyline, had a main character and contained drama, $\alpha = 0.66$). Emotion ratings were averaged and ads that scored above the mean ($m = 3.4$) were classified as highly emotional (see Appendix). It is important to note that all ads rated well above the mid-point (2) on this average scale from 0 ‘none of this feeling’ to 4 ‘a great deal of this feeling’, and so all were successful in evoking some emotion. The three narrativity items were averaged and ads that scored above the mean ($m = 4.2$) were categorized as highly narrative (see Appendix).

There were three ads aired in Victoria over the study period not included in this ad rating study but that were categorized by the research team using characteristics known to relate to strong emotions (i.e. graphic or visceral images and/or shocking or extremely emotional scenarios) and narrativity (a storyline, character/s and drama). Of the 13 different ads aired, 4 were rated as both highly emotional and high on narrativity, 2 as highly emotional but lower on narrativity, 3 as lower on emotion and but high on narrativity and 4 as lower on emotion and lower on narrativity (see Appendix).

Target audience ratings points (TARPs) for the Quitline target group of 18- to 39-year-old smokers were provided by ACNielsen [29]. TARPs are a standard measure of television advertising weight and are used to indicate the number of people within a certain demographic group that were exposed to an advertisement within a given period of time. A value of 100 TARPs for 1 week is equal to an average of one exposure per person in the target population within that week of the ad. Inspection of the records of weekly TARPs for each ad indicated that one ad was on air at-a-time for the vast bulk (83%) of the study period, and during the weeks when there were two ads rotated and aired during the same week (17%), the same ad types were on air together. Therefore, calls received during weeks when each of the different types of ads were on air could be identified and differentiated based on the above categorizations of that ad. As the second hand smoke ad (Smokefree Homes and Cars) did not include the quitline number at the end of the ad and was not designed to motivate smokers to call the quitline, the TARPs for this ad were not included.

Socio-economic status

Postcodes were provided by quitline callers who requested a smoking quit pack be sent to them or to speak to a quitline advisor (approximately 95% of all callers). We categorized callers using their postcodes to into four socio-economic groups based
on the socio-economic index for areas (SEIFA). SEIFA ranks postal areas (postcodes) on a continuum of advantage/disadvantage, taking into consideration characteristics such as income, education, occupation and housing that may enhance or reduce socio-economic conditions of the area [30]. For the purpose of analysis, we have grouped callers into four groups based on this scale.

These four SEIFA groups provide an even split of Australian ‘postcodes’, so they do not split the Victorian population evenly. The 2007 Victorian smoking and health population survey [31] indicated that 41% of the Victorian population, resides in areas categorized as high SES, while 30% reside in mid-high areas, 15% in mid-low areas and 15% in low areas. The 2007 Victorian Smoking and Health population survey [31] also indicated that 22% of those living in low SES areas smoke, 22% in mid-low areas smoke, 19% in mid-high areas smoke and 11% in high SES areas smoke. Of all those who are smokers, 20% live in low SES areas, 20% live in mid-low SES areas, 34% live in mid-high SES areas and 26% live in high SES areas, and so this should be the distribution of calls to the Quitline from these groups if smokers from these groups called in equivalent proportions.

Analyses

The outcome variable, quitline calls, was negatively skewed, showed evidence of overdispersion (mean = 78.78, variance = 1234.88 calls per week) and of temporal auto-correlation (based on auto-correlation plots of the residuals). To account for this, we used negative binomial regression on the count of Quitline calls, with Newey–West adjusted standard error [32] to correct for auto-correlation (over 12 weeks). In each analysis, the following covariates were tested and entered if significant: the 2-week period after new year and the 3-week period leading up the end of the year to account for yearly pattern of a drop in calls around the Christmas period and the increase in calls associated with new years resolutions; the week of world no tobacco day; the first week of the launch of new ads to account for the novelty of newly created ads; the 2-week period immediately after the introduction of the smokefree bars and pubs legislation and the three periods of rotation of the two sets of GHW on cigarette packs [33, 34]. Specifically, we separately categorized the change over period from November to February each year when both sets were in rotation, from Set B rotation period from March 2007 to October 2007 and from Set A rotation period from March 2008 to October 2008.

We used the population count of smokers aged 18+ years within each SES group as the offset term to adjust for the differential rates of smokers within each SES group in all statistical analyses. This permitted the original Quitline call variable to be used as the dependent variable in all analyses rather than an adjusted form of this variable. Additional analyses indicated that using either the offset term or using an adjusted form of the dependent variable resulted in exactly the same substantive interpretation of results. However, we did use an adjusted form of Quitline call rates within each SES group for the count data presented in Fig. 1 to ensure the equivalent form of data (i.e. that which accounted for the differential rates of smokers within each SES group) was presented. We also used a time variable (week since the start of the observation period) as a covariate to de-trend the data. Although the anti-smoking medication Champix (Varenicline) was introduced during this period (in January 2008), it was highly correlated with the New Year period, and as the New Year period was more strongly related to quitline calls, this variable was retained instead of the introduction of Champix. All analyses were undertaken in Stata 11.0 using the form of negative binomial found in Stata’s glm command.

The first model examined the first hypothesis of the effect of overall TARPs on quitline calls, adjusting for all covariates associated with call rates at \( P < 0.05 \) in preliminary univariate models, including SES. To test the second hypothesis, we added interaction terms between each SES group and overall TARPs. The next model examined the relationship between call rates and TARPs for each of the different ad types to test the third hypothesis. To test the fourth hypothesis, we added interaction terms between SES group and the TARPs for each ad type to the model and Wald tests were used to determine whether interac-
tions were significant. To explore the nature of interactions, the models were re-run stratified by SES providing the rate ratios for Fig. 2. Post hoc tests examined differences between ad types within each SES group. We also tested models that included the squared terms for overall TARPs to examine whether the relationship was non-linear (i.e. whether there was a point at which the effect of increasing TARPs on Quitline calls started to wear out or diminish).

Results

In total, over 107 weeks, Victorians were potentially exposed to 8839 anti-smoking ad TARPs, or each person within the target population was potentially exposed, on average, 88.39 times to an anti-smoking ad. The rates of exposure were similar across ad types, with each person within the target group exposed 20.22 times to higher emotion narrative ads, 21.49 times to higher emotion non-narrative ads, 20.63 times to lower emotion narrative ads and 26.05 times to lower emotion non-narrative ads. In total, the Victorian quitline received 6275 calls from low SES (18.61% of total calls; \( m = 89.90 \) (SD = 24.89) calls per week or \( m = 37.96 \) (SD = 10.51) calls per 100 000 smokers) and 12 367 calls from high SES callers (36.68% of total calls; \( m = 115.58 \) (SD = 32.67) calls per week or \( m = 63.25 \) (SD = 17.89) calls per 100 000 smokers).

Univariate models of potential covariates indicated that TARPs [Rate Ratios (RR) = 1.156, \( P < 0.001 \)], the first week of airing a new ad (RR = 1.154, \( P = 0.027 \)), the introduction of smokefree pubs and clubs legislation (RR = 1.221, \( P = 0.029 \)), end of year period (RR = 0.529, \( P < 0.001 \)), new year period (RR = 1.682, \( P < 0.001 \)) and rotation of Set A of the GHW series (series A versus series B (ref), RR = 1.370, \( P = 0.002 \); series A versus combination of series A and B (ref), RR = 1.211, \( P = 0.035 \) and combination of A and B versus series B, RR = 1.131, \( P = 0.225 \)) was significantly related to the number of quitline calls. However, the week of world no tobacco day was not significantly associated (RR = 1.116, \( P = 0.350 \)). When all of these significant covariates were entered into a multivariate model, the first week of airing a new ad became non-significant (\( P = 0.095 \)).

As predicted by our first hypothesis, after all significant covariates were included, increases in anti-smoking advertising TARPs were significantly associated with the number of quitline calls (RR = 1.070, \( P = 0.005 \); Table I. The squared term,
added to the model to test whether TARPs might wear out at higher levels, was not significant (RR = 0.971, \( P = 0.210 \)).

Figure 1 shows calls to quitline per week per 100 000 smokers in the population for each SES group from 10 December 2006 to 31 December 2008. Consistent with this pattern, analysis of call rates over this period by different SES groups, after accounting for the proportion of smokers in each SES group in the Victorian population (as per Siahpush et al. [13]), indicated that the Victorian quitline received a significantly higher rate of calls from high SES (RR = 4.177, \( P < 0.001 \)) and mid-high SES (RR = 1.804, \( P < 0.001 \)) smokers compared with those from the low SES group, but that call rates from mid-low SES smokers (RR = 0.869, \( P < 0.001 \)) were significantly lower than those from the low SES smokers (Table I). Supporting our second hypothesis, the joint Wald test indicated that there was no interaction between TARPs and SES group \( P = 0.223 \).

As shown in Table II and consistent with our third hypothesis, higher emotion narrative ad TARPs had the strongest relationship with quitline calls (RR = 1.132, \( P = 0.001 \)). The next strongest relationship was with lower emotion narrative TARPs (RR = 1.108, \( P = 0.001 \)) and then higher emotion non-narrative TARPs (RR = 1.065, \( P = 0.051 \)), while there was no relationship between call rates and lower emotion non-narrative TARPs (RR = 0.992, \( P = 0.816 \)).

Interaction terms between SES and TARPs levels for each type of ad were added to the model, and Wald tests indicated that there was a non-significant trend for an interaction between SES and high emotion narrative TARPs \( P = 0.077 \); a trend towards an interaction between SES and high emotion non-narrative TARPs \( P = 0.144 \); no interaction between SES and low emotion narrative TARPs \( P = 0.881 \) and no interaction between SES and low emotion non-narrative TARPs \( P = 0.673 \). The model was re-run stratified by SES, and post hoc tests of differences between each ad pair were conducted (details available from authors). There were strong evidence of differences between ad types in their effectiveness in generating calls from the low SES group, and the mid-low SES group, with significant differences between all possible ad pairs, except higher and lower emotion non-narrative ads in both groups. There were also significant differences for all
possible ad pairs within the mid-high SES group and in the high SES group for all possible ad pairs, except higher and lower emotion non-narrative ads. Figure 2 shows the rate ratios of quitline calls and TARPs for each type of ad for each SES group separately. Supporting our fourth hypothesis, higher emotion narrative ad TARPs generated the greatest increases in calls from both low SES (RR = 1.143, P = 0.001) and mid-low SES (RR = 1.153, P = 0.016) groups compared with the other ad types. The lower emotion narrative ads also generated greater increases in calls from low SES smokers (RR = 1.109%, P < 0.001) and mid-low SES smokers (RR = 1.097, P = 0.001) than the higher emotion non-narrative ads (low SES RR = 1.042%, P = 0.303, mid-low SES RR = 1.063, P = 0.137). The lower emotion non-narrative ads were least likely to generate calls from lower SES groups (low SES RR = 0.977, P = 0.669, mid-low SES RR = 0.964, P = 0.394).

For the mid-high SES group, each ad type was associated with similar increases in calls (high

---

### Table I. Rate ratios for quitline calls associated with anti-smoking TARPs, and covariates

<table>
<thead>
<tr>
<th>Predictors of quitline calls</th>
<th>Rate ratios (95% Confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TARPs</td>
<td>1.070 (1.020–1.122)**</td>
</tr>
<tr>
<td>Time[35]</td>
<td>1.000 (0.999–1.000)</td>
</tr>
<tr>
<td>Smokefree pubs and clubs legislation</td>
<td>1.269 (1.130–1.426)***</td>
</tr>
<tr>
<td>End year period (Last 3 weeks of the year)</td>
<td>0.553 (0.415–1.738)***</td>
</tr>
<tr>
<td>New year period (First 2 weeks of the year)</td>
<td>1.459 (1.188–1.792)***</td>
</tr>
<tr>
<td>GHW Set B</td>
<td>Ref</td>
</tr>
<tr>
<td>GHW Set A and B</td>
<td>1.177 (1.019–1.359)*</td>
</tr>
<tr>
<td>GHW Set A</td>
<td>1.242 (1.095–1.408)**</td>
</tr>
<tr>
<td>Low SES</td>
<td>Ref</td>
</tr>
<tr>
<td>Mid-low SES</td>
<td>0.869 (0.828–0.911)***</td>
</tr>
<tr>
<td>Mid-high SES</td>
<td>1.805 (1.717–1.897)***</td>
</tr>
<tr>
<td>High SES</td>
<td>4.177 (3.908–4.465)***</td>
</tr>
</tbody>
</table>

In units of 100 TARPs per week.*P < 0.05; **P < 0.01; ***P < 0.001.

### Table II. Rate ratios for quitline calls associated with exposure to different ad type TARPs, adjusting for covariates

<table>
<thead>
<tr>
<th>Predictors of quitline calls</th>
<th>Rate ratios (95% Confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher emotion narrative TARPs*</td>
<td>1.132 (1.049–1.222)**</td>
</tr>
<tr>
<td>Higher emotion non-narrative TARPs*</td>
<td>1.065 (1.000–1.133)*</td>
</tr>
<tr>
<td>Lower emotion narrative TARPs*</td>
<td>1.108 (1.045–1.176)**</td>
</tr>
<tr>
<td>Lower emotion non-narrative TARPs*</td>
<td>0.992 (0.931–1.058)</td>
</tr>
<tr>
<td>Time [35]</td>
<td>1.000 (0.999–1.000)</td>
</tr>
<tr>
<td>Smokefree pubs and clubs legislation</td>
<td>1.235 (1.114–1.368)***</td>
</tr>
<tr>
<td>GHW Set B</td>
<td>Ref</td>
</tr>
<tr>
<td>GHW Set A and B</td>
<td>1.203 (1.044–1.386)*</td>
</tr>
<tr>
<td>GHW Set A</td>
<td>1.235 (1.089–1.401)***</td>
</tr>
<tr>
<td>End year period (last 3 weeks of the year)</td>
<td>0.541 (0.411–0.712)***</td>
</tr>
<tr>
<td>New year period (first 2 weeks of the year)</td>
<td>1.457 (1.223–1.736)***</td>
</tr>
<tr>
<td>Low SES</td>
<td>Ref</td>
</tr>
<tr>
<td>Mid-low SES</td>
<td>0.868 (0.828–0.911)***</td>
</tr>
<tr>
<td>Mid-high SES</td>
<td>1.806 (1.718–1.898)***</td>
</tr>
<tr>
<td>High SES</td>
<td>4.180 (3.908–4.471)***</td>
</tr>
</tbody>
</table>

In units of 100 TARPs per week.*P ≤ 0.05; **P < 0.01; ***P < 0.001.
emotion narrative RR = 1.100, $P < 0.001$; high emotion non-narrative RR = 1.082, $P < 0.001$; low emotion narrative RR = 1.109, $P < 0.001$), with the exception of the lower emotion non-narrative ads (RR = 1.006, $P = 0.227$). For the high SES group, higher emotion narrative ads generated the greatest calls (RR = 1.131, $P < 0.001$), closely followed by lower emotion narrative ads (RR = 1.116, $P < 0.001$), while higher emotion non-narrative ads were associated with lower marginal increases in calls (RR = 1.076, $P = 0.059$). The lower emotion non-narrative ads were least likely to generate calls from the high SES groups (RR = 1.020, $P = 0.343$).

### Discussion

Consistent with previous research [4–9], and in line with our first hypothesis, greater anti-smoking advertising was associated with greater increases in quitline calls. For every 100 TARPs per week (or one exposure per person in the target population per week), calls increased by 7%. Consistent with our second hypothesis, the relationship between overall TARPs and quitline call rates did not differ by SES group. That is, although there was an over-representation of Quitline calls from the high SES group over the study period, when the ads were on air, Quitline calls increased by the same degree across each SES group. This suggests that the overall effect of the advertising aired over this period neither increased nor reduced SES disparities in quitline calls. This is consistent with a previous study examining Victorian quitline calls over an earlier period of time [13].

As predicted by our third hypothesis, we found a stronger relationship between call rates and the extent of exposure to ads that contained either the higher emotion and/or narrative elements compared with ads without these elements (i.e. the lower emotion non-narrative ads). For each 100 TARPs of higher emotion narrative, higher emotion non-narrative and lower emotion narrative ads aired, calls increased by 13, 6.5 and 11%, respectively. These findings add to the growing body of evidence of the importance of eliciting negative emotional responses through anti-smoking advertising [15–20, 22]. The significant effects of higher and lower emotion narrative ads highlight the potential of story-based or narrative communication. This builds on recent social psychological research on narrative communication [36, 37] which suggests that narrative effects stem from processes of identification and transportation into the story, so that perceptions of vulnerability are heightened, leading to a greater impact on personal beliefs and attitudes [28, 38, 39]. In contrast, the extent of exposure to lower emotion non-narrative ads did not significantly predict increased calls, despite these ads all featuring the quitline number and explicitly aiming to motivate smokers to call the quitline.

Consistent with our fourth hypothesis and with our previous cohort study of quitting behaviour [22], we found substantially greater increases in calls to quitline from low SES groups when higher emotion narrative ads were on air. The relative advantage for these higher emotion narrative ads was not as strong among higher SES groups, suggesting that these types of ads may help to reduce SES disparities between callers to the quitline. Highly emotional narrative or story-based messages might work particularly well with low SES smokers as these messages rely on the viewer relating emotionally to another person’s situation. Perceptions of group and personal vulnerability may be increased through identification with characters in the ads and by providing health information in a story-based format, which people learn to process naturally from early in life [39–41]. Consistent with this, the lower emotion narrative messages were also successful in generating substantial calls from lower SES groups, albeit to a lesser extent than the higher emotion narrative ads. In contrast, the non-narrative ads were less successful with the lower SES groups. These ads rely on the viewer being convinced by persuasive arguments from experts which may require higher levels of health and numeric literacy, not typically found in lower SES groups [42, 43]. The lower emotion non-narrative ads were unsuccessful across all SES groups.

Reflecting the expected pattern observed each year of smokers delaying quitting over the festive
period and committing to quitting in the new year, the end of year period was significantly associated with reduced call rates and the new year period with increased call rates. Consistent with research from New Zealand, the new smokefree pubs and clubs legislation was significantly related to increased calls. Consistent with previous advertising research [25], the first week of airing new ads was related to increases in calls but only at the univariate level. The rotation to Set A of the GHW on cigarette packs, which includes strong graphic images of mouth cancer and gangrene, was also associated with increased call rates. This is consistent with a previous examination of the impact of the initial introduction of this set of the GHW on Quitline calls in Australia in 2006 [23]. In contrast, the rotation to Set B of the GHW was associated with lower call rates. This may be due to this set featuring fewer direct health effects and more already well-known images, than in Set A.

There are some limitations of this study that need to be acknowledged. The set of ads aired over the study period were all successful in evoking emotion, and so we could only examine differences within these generally emotionally evocative ads. Smokers in the Australian state of Victoria have been exposed to graphic and visceral depictions of the health effects of smoking regularly since 1997, and the graphic ads that were rated as less emotionally evocative were those that have been aired more frequently over more years (Sponge first aired in the 1980s; Artery and Tar first aired in 1997; Bubble-wrap first aired in 2005). These ads may evoke higher levels of emotion from other populations less frequently exposed to these types of graphic anti-smoking ads. As such, these findings may actually underestimate the difference in high and low SES response to higher versus lower emotion ads.

Callers were categorized into SES groups based on a residential area measure rather than on an individual or household based measure such as income, education or minority status. We were unable to examine the consistency of our findings using these alternative measures as this information was not routinely collected from all callers by Quitline. Further research is needed to examine if these effects hold using alternate individual based measures of SES. In future research, if data are available on the ethnicity of the callers, differences in response to ads containing people of similar or different ethnicity could also be examined. It also should be acknowledged that only a small proportion of smokers ever call the quitline and calling the quitline is only one measure of population motivation to quit after exposure to anti-smoking ads. Therefore, although one study has found similar effects for high emotion and narrative ads on quitting behaviour in Massachusetts [22], more research is required to further examine the effects of these different types of ads on verified quit attempts and quitting behaviour among disadvantaged smokers in other jurisdictions and with different sets of ads. Also, this research did not examine other design elements of the ads, including the number of cuts, use of loud and fast music or surprise endings which have been found to be associated with greater recall among teens [44].

In summary, higher emotion narrative style ads generated the highest call response of any type of ad for more disadvantaged groups, but still generated good call responses for more advantaged groups. These findings suggest airing these types of ads may contribute to reducing socio-economic disparities in calls to quitline through maximizing the responses of lower SES smokers. Tobacco control ads that predominately depict highly emotive stories of the consequences of smoking-related diseases on smoker’s lives and the lives of their family and friends are likely to optimize disadvantaged groups’ utilization of quitline services and increase their chances of quitting successfully.

**Funding**

Quit Victoria, Australia and The Cancer Council Victoria, Australia M.W. was supported by a National Health and Medical Research Council, Principal Research Fellowship (NHMRC #396400).

**Acknowledgements**

We appreciate the contribution of the Molly McCarthy, Francis Icasiano, Cate Dellow and James S. J. Durkin et al.
Renton, who helped to facilitated the development, collection and integration of detailed Quitline data. We thank Quit Victoria and The Cancer Council Victoria for funding the study.

**Conflict of interest statement**

None declared.

**References**


### Appendix 1

| Emotion and narrative categorizations with descriptions of different ads |
|---|---|---|
| | Higher emotion<sup>a</sup> | Narrative<sup>b</sup> | Description |
| Parents | Yes (3.6) | Yes (4.5) | Depicts a young girl beside her dad in a hospital bed telling him a story about a game she played with her uncle, and ends with her saying ‘You should have been there...’. |
| Amputation<sup>c</sup> | Yes (3.6) | Yes (4.3) | Depicted a man who had gangrene caused by smoking and was about to have an amputation. |
| Mouth Cancer Talks<sup>c</sup> | Yes (3.8) | Yes (4.7) | Depicted a woman with mouth cancer telling the viewer how smoking caused her cancer. |
| Carotid<sup>d</sup> | No (3.3) | Yes (4.3) | Showed surgeons in an operating theatre performing surgery on a woman’s neck to remove a fatty deposit, caused by smoking, in the main artery leading to the brain. |
| Voice Within<sup>d</sup> | No (na) | Yes (na) | Depicts a man who has had a stroke being fed by his wife, his wife speaks about the stroke and we can hear the man’s thoughts. |
| Quitting is hard. Not quitting is harder. | No (na) | Yes (na) | Depicts some of the common excuses smokers make for not quitting and then jumps to the health consequences of using these excuses to not give-up. In the last scenes a smokers says ‘no, I don’t think I can quit’ and then we see a doctor looking at an X-ray saying ‘no, I don’t think I can operate’. Uses a sponge as a visual metaphor for lungs saturated with tar from smoked cigarettes. The sponge is wrung out into a beaker to depict how much tar builds up in a smoker’s lung each year. |
### Appendix 1.  *Continued*

<table>
<thead>
<tr>
<th>Description</th>
<th>Higher emotion&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Narrative&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bubblewrap</td>
<td>No (3.0)</td>
<td>No (3.5)</td>
<td>Depicts a piece of plastic bubblewrap cut in the shape of two lungs and a trachea. A hand with a lit cigarette starts at the bottoms of the lungs bursting the bubbles one by one with the burning tip of a cigarette. The voice-over describes how smoking causes emphysema.</td>
</tr>
<tr>
<td>Bronchoscopy</td>
<td>Yes (3.5)</td>
<td>No (4.2)</td>
<td>Shows an X-ray of lungs with a whistling noise as the lungs breath. The doctor explains that sometimes you can hear the lung cancer before you see it. There is a young woman lying on the operating table and the doctor places a tube in her throat so that we can see inside her lungs.</td>
</tr>
<tr>
<td>Zita</td>
<td>Yes (3.9)</td>
<td>Yes (4.6)</td>
<td>Shows ‘Zita’, a 37-year-old mother of three children who is in the final stages of dying from lung cancer caused by smoking. Zita talks directly to camera describing her feelings and emotions about being diagnosed with lung cancer, her family and what the future holds for those she will leave behind.</td>
</tr>
<tr>
<td>Artery&lt;sup&gt;e&lt;/sup&gt;</td>
<td>No (3.3)</td>
<td>No (4.2)</td>
<td>Re-airing of a previously widely aired campaign ‘Every cigarette is doing you damage’. Artery depicts the fat being squeezed from the artery of a smoker.</td>
</tr>
<tr>
<td>Tar&lt;sup&gt;e&lt;/sup&gt;</td>
<td>No (na)</td>
<td>No (na)</td>
<td>Tar depicts tar from a beaker being poured over a healthy lung to show the amount accumulated over a year by an every day smoker. This campaign included 15-sec versions of these ads with the theme ‘Every day without cigarettes is doing you good’.</td>
</tr>
<tr>
<td>Separation</td>
<td>Yes (3.8)</td>
<td>No (4.2)</td>
<td>A mother and her child are at a train station. The mother lets go of her child’s hand and disappears into the crowd. The child then becomes scared and distressed. The voice-over states ‘If this is how your child feels after losing you for a moment, imagine if they lost you for a lifetime’.</td>
</tr>
</tbody>
</table>

All ads can be viewed at www.quit.org.au

<sup>a</sup>Seven negative emotion ratings were measured on a scale from 0 ‘none of this feeling’ to 4 ‘a great deal of this feeling’ and were averaged (mean = 3.4)

<sup>b</sup>Three narrativity items were measured on a scale from 1 ‘strongly disagree’ to 5 ‘strongly agree’ and were averaged (mean = 4.2).

<sup>c</sup>Amputation and Mouth Cancer Talks were aired together as the one campaign.

<sup>d</sup>Carotid and Voice Within were aired individually and concurrently over the study period.

<sup>e</sup>Artery and Tar were aired together as one campaign.