



How does the emotive content of televised anti-smoking mass media campaigns influence monthly calls to the NHS Stop Smoking helpline in England?



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ABSTRACT

Objective. To investigate the effects of different types of televised mass media campaign content on calls to the English NHS Stop Smoking helpline.

Method. We used UK government-funded televised tobacco control campaigns from April 2005 to April 2010, categorised as either “positive” (eliciting happiness, satisfaction or hope) or “negative” (eliciting fear, guilt or disgust). We built negative binomial generalised additive models (GAMs) with linear and smooth terms for monthly per capita exposure to each campaign type (expressed as Gross Ratings Points, or GRPs) to determine their effect on calls in the same month. We adjusted for seasonal trends, inflation-adjusted weighted average cigarette prices and other tobacco control policies.

Results. We found non-linear associations between exposure to positive and negative emotive campaigns and quitline calls. The rate of calls increased more than 50% as exposure to positive campaigns increased from 0 to 400 GRPs (rate ratio: 1.58, 95% CI: 1.25–2.01). An increase in calls in response to negative emotive campaigns was only apparent after monthly exposure exceeded 400 GRPs.

Conclusion. While positive campaigns were most effective at increasing quitline calls, those with negative emotive content were also found to impact on call rates but only at higher levels of exposure.

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Introduction

Telephone-based smoking cessation services, or quitlines, have become a key part of many comprehensive tobacco control programmes (Piné-Abata et al., 2013) as they provide an accessible, effective and cost-efficient means of providing evidence-based treatment to large numbers of smokers (Anderson and Zhu, 2007). However, the success of a quitline relies on promotion of its use to smokers, with national smoking cessation mass media campaigns playing a major role in encouraging quitting and prompting calls (Bala et al., 2013). While previous studies have shown that rates of calls to quitlines are

influenced by seasonal effects (Delnevo et al., 2006; Langley et al., 2012) and associated with the concurrent volume of televised campaigns (Langley et al., 2012; Erbas et al., 2006; Mosbaek et al., 2007; Farrelly et al., 2011, 2013; Miller et al., 2003; Schillo et al., 2011), type and timing of campaigns may influence their efficacy at increasing quitline calls (Mosbaek et al., 2007; Farrelly et al., 2011; Carroll and Rock, 2003; Durkin et al., 2011, 2012), there is currently a paucity of evidence regarding the impact of different types of emotional campaign content on quitline calls. Furthermore, no previous studies have used data from the UK where there has been a more diverse mix of campaigns in terms of emotive content than in some other countries (Langley et al., 2013). While some UK campaigns have focussed on the negative consequences of smoking using fear appeals, personal testimonies or graphic imagery, all common features of Australian tobacco control campaigns which have received substantial attention in the literature (Durkin et al., 2011; Wakefield et al., 2011), others have aimed to promote the benefits of quitting and provide support.

The evidence base, however, is limited and the results of individual studies vary. Mosbaek et al. (2007) have suggested that negative

Abbreviations: AIC, Akaike Information Criterion; EDF, effective degrees of freedom; GAM, generalised additive model; GRP, Gross Ratings Point; NHS, National Health Service; TCS, Tobacco Control Scale.

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emotive campaigns shown in the evening featuring testimonials and campaigns giving practical information on how to quit had the greatest impact on calls to the Oregon tobacco quitline. A study from New York State found that although campaigns featuring graphic images portraying the health harms of smoking increased call volume (Farrelly et al., 2011), those with strong negative emotive content alone were ineffective. By contrast campaigns with more pronounced negative emotive content generated more calls to the Victoria quitline (Durkin et al., 2011).

To ensure that mass media campaigns are maximally effective, it is important to understand which features encourage behaviour change or prompt smokers to seek support. We therefore evaluated the impact of different types of emotive content in televised mass media campaigns on rates of calls to the English National Health Service (NHS) Stop Smoking helpline, a country-wide smoking cessation service providing both telephone counselling support and information from trained advisers on other NHS services.

Materials and methods

Outcome measure: quitline calls

The outcome variable was generated using UK Department of Health data on calls to the English NHS Stop Smoking helpline between April 2005 and April 2010, expressed as monthly count data.

Campaign exposure

Film recordings of individual advertisements and measures of campaign exposure were obtained for government-funded televised tobacco control mass media campaigns in England from April 2005 to April 2010 from the Central Office of Information and the UK Department of Health Tobacco Marketing Team. While full recordings were available for 51% of the individual advertisements and their variants, still images and monthly exposure measures were available for all advertisements.

Campaigns were categorised independently by two researchers using a theory-driven approach based on PRIME Theory (West, 2009), and divided into three mutually exclusive categories according to their emotional content – “positive” (eliciting happiness, satisfaction or hope), “negative” (eliciting fear, guilt or disgust) or “neutral”, as previously described (Langley et al., 2013). There was complete agreement between them on the content of each advertisement but one; for which a third researcher resolved the disagreement. Coding was then validated by an eight-member subset of the UK Centre for Tobacco and Alcohol Studies’ Smokers Panel and there was no meaningful discrepancy between their interpretations and our own. Exposure was quantified in GRPs (Gross Ratings Points), a standard advertising industry measure of campaign reach equivalent to the summed ratings of individual advertisements across multiple campaigns; giving a per capita measure of advertising exposure. For example, 400 GRPs could indicate that 100% of the population are exposed to four advertisements, or that 50% are exposed to eight advertisements. Individuals’ actual exposure varies according to frequency, channel and time of television viewing.

For each month, we derived per capita measures of exposure to all campaigns, and to positive, negative and neutral campaigns. These also included GRPs for campaigns run by charities such as the British Heart Foundation and Cancer Research UK but funded by the Department of Health, which all made use of graphic imagery and warned of the health risks of smoking. These advertisements, which accounted for 809 GRPs during the period studied, were all considered to contain negative emotive content.

We also coded each available recording for the presence of a quitline number which we hypothesised was likely to influence call rates. However, without full recordings for each televised advertisement, and in particular the final image, which often included a behavioural prompt, we were unable to derive a comparable measure of monthly exposure to those featuring the quitline number. We used the available data to look for evidence of differential use of the quitline number between different campaign types.

Statistical analysis

We initially modelled the effect of total monthly exposure, and then the mutually adjusted effects of exposure to positive and negative emotive campaigns, on monthly quitline calls using negative binomial generalised

additive models (GAMs), with effect sizes expressed as rate ratios. Models were fitted in R version 3.0.2 for Windows using the gam function from the library mgcv (version 1.7-22).

We explored the effects of positive and negative campaigns as one and two month lagged effects, but model fit, as determined using the Akaike Information Criterion (AIC), was not improved when these lagged effects were introduced. Our final models therefore included terms for GRP exposure in the same month only. This is consistent with previous work which suggests that 60–80% of telephone responses to televised advertisements promoting a quitline are made within the first 10 min of broadcast (Prager, 1993), and that activity diminishes rapidly afterwards (Carroll and Rock, 2004).

We fitted the effects of campaign exposures as linear terms, enabling us to compare the effect size between campaign types. Since the most recent review concluded that 1200 GRPs per quarter are required to reduce adult smoking prevalence (Durkin et al., 2012), our sizes of effect were expressed in terms of rate ratios per 400 additional GRPs in the same month. We then modelled campaign exposures as mutually adjusted smooth terms using restricted cubic regression splines. The effective degrees of freedom (EDF), a measure of nonlinearity where an EDF of 1 indicates linear association between the term and the link function (log monthly calls), was used to determine the shape of the relationship. Neutral campaigns occurred in only nine months during the study period, and were therefore only considered as a potential confounder in our analysis and exposure fitted as a linear term only.

Models also contained terms for effects of time and seasonality. Time in months was fitted as a smooth term using a thin plate spline as the EDF suggested the presence of a non-linear time trend. A cyclic cubic regression spline term for month of the year was also fitted to capture any effects of seasonality. Number of days in the month was also included a priori as a linear covariate. Adjustment was also made for exposure to neutral campaigns in the same month modelled as a linear effect.

We additionally adjusted for other potential confounders, including a measure of the extent of other tobacco policies enacted in England from 2005 to 2010 based on the Tobacco Control Scale (TCS) developed by Joossens and Raw (2006), operationalised as a categorical variable for increasing tobacco control activity over time. We also adjusted for the weighted average retail price of cigarettes in the same month, with figures obtained by multiplying the market share and the CPI inflation-adjusted price of a pack of 20 cigarettes for each brand (Gilmore et al., 2013).

All models included an offset term to account for the size of the English smoking population over the age of 16, calculated using estimates of smoking prevalence from the Health Survey for England and interpolated mid-year population estimates from the (UK Office for National Statistics).

We also tested our final models for any temporal autocorrelation structure using plots of the residuals; none was found. Finally, we re-fitted our models with an additional tensor product smooth interaction term to test for interaction between positive and negative campaigns in the same month. This did not improve model fit, however, and was subsequently dropped from our models.

Results

Between April 2005 and April 2010, the quitline received a total of 1,227,189 calls. Monthly calls ranged from 8,034 to 66,091, with a mean of 20,118. Calls tended to peak in January (with a mean of 38,183) and were lowest in November (with a mean of 14,971).

Per capita monthly exposure to all types of televised mass media campaigns ranged from 0 to 1135 GRPs, with a monthly mean of 305.2 GRPs. Out of a total of 18,618.9 GRPs, 8238.8 GRPs (or 44.2%) were designed to elicit negative emotions while 9589.9 (or 51.5%) were designed to elicit positive emotions. A further 790.2 GRPs (or 4.2%), the majority of which were broadcast to increase awareness of the introduction of smokefree legislation in July 2007, were considered to be emotionally neutral. There was little correlation between exposure to negative and positive emotive campaigns in the same month ($r = 0.087$, $p = 0.505$). Total monthly quitline calls and exposures to positive and negative campaigns over time are shown in Fig. 1.

After adjustment for seasonal and time trends, cigarette price and other tobacco control policies, our initial model showed that total monthly exposure to all campaign types was associated with a significant increase in monthly calls to the helpline (rate ratio per 400 GRPs:

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