Anti-tobacco television advertising and indicators of smoking cessation in adults: a cohort study

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Abstract

The objective of this study was to assess the relationship between exposure to state-sponsored anti-tobacco advertising and smoking cessation. Cessation rates in 2001 among a cohort of 2061 smokers who participated in the Community Intervention Trial for Smoking Cessation between 1988 and 1993 and completed a follow-up survey in 2001 were merged with 2000–01 television advertising exposure data from Nielsen Media Research. The relative risk for quitting was estimated to be 10% higher for every 5000 units of exposure to state anti-tobacco television advertising over the 2-year period, although this did not quite achieve statistical significance. The association was even larger among those who reported that the level of information in the media about the dangers of smoking had increased ‘a lot’ between 1993 and 2001 (RR = 1.19, 95% CI = 1.03–1.38). These data are consistent with the finding that increased exposure to state anti-tobacco media increases smoking cessation rates.

Introduction

Televised anti-smoking advertisements are an important component of comprehensive tobacco control programs. They are designed to counter pro-tobacco influences and increase pro-health messages throughout a state, region or community. These advertisements may promote smoking cessation as well as decrease the likelihood of initiation. They also can have a strong influence on public support for tobacco control interventions [1].

Evidence suggests that state-sponsored anti-smoking media campaigns may play a potentially effective role in reducing smoking among those exposed to the message [2–7]. In the United States, electronic anti-tobacco advertising has been used as part of comprehensive tobacco control programs in several states and communities. McAlister et al. [8] found that significant reductions in adult tobacco use can be achieved through a combination of intensive media and community campaigns. In California, the tobacco control program was associated with a 10–13% decline in cigarette consumption, 21% of which was estimated to be due to the media campaign [9, 10].

Another factor pointing to the importance of anti-tobacco advertising in reducing population smoking behavior is the length to which the tobacco industry will go in seeking to divert funding away from such advertising into strategies with lower levels of population impact. Extensive lobbying of legislators by the tobacco industry and groups associated with the industry has been documented in many of the states with comprehensive programs involving media campaigns [11, 12].
Traditionally, precise measurement of the impact of media exposure on behavior has been methodologically difficult. Most studies have focused on evaluation of campaigns in a single jurisdiction, with the resulting difficulty of lack of a good control group. Additional problems include misspecification of exposure due to differential recall and the lack prospective data that pinpoints the exposure before the behavior change takes place. Using a large cohort of smokers with detailed smoking data collected prospectively, in addition to independently assessing advertising exposure data from a range of communities with wide variation in levels of exposure to state-run media campaigns, we aimed to test the hypotheses that adults exposed to more state-sponsored anti-tobacco advertising will be more likely to successfully stop smoking.

### Methods

#### The original Community Intervention Trial for Smoking Cessation study—1988–93

Details of the Community Intervention Trial for Smoking Cessation (COMMIT) intervention are published elsewhere [13]. Briefly, the COMMIT cohort was identified by a telephone survey in 1988. Participants were current smokers aged 25–64 years who lived in communities that were located in California, Iowa, Massachusetts, New Mexico, New Jersey, New York, North Carolina, Oregon, Washington and Ontario, Canada. An extended interview that included questions about current and past smoking behaviors, brand and type of cigarette usually smoked, interest in quitting smoking and other smoking-related attitudes and behaviors was completed in 1988.

#### 2001 Follow-up survey of original COMMIT cohort participants

In the summer of 2001, we re-interviewed US cohort participants who had completed the 1993 interview, with the aim of measuring long-term changes in smoking behavior. Among the 12435 baseline smokers who resided in the United States, were interviewed in 1993 and agreed to be re-contacted in the future, 6603 (53%) were successfully re-interviewed in 2001. Data for this paper are restricted to participants who resided in the same community in 1988 and 2001, lived in one of the top 75 media markets, and were smokers in 1999 (n = 2061).

### Exposure to tobacco control television media

Data from the 2001 follow-up survey were merged with television ratings data acquired from Nielsen Media Research (NMR). NMR collects data on occurrences of all tobacco-related television advertisements appearing on network and cable television across the largest 75 media markets in the United States for the years 1999–2000. A media market or designated market area is defined by a group of non-overlapping counties, which comprise a major metropolitan area. Fifteen of the 20 US COMMIT communities were located in one of these largest media markets.

Using a combination of diary measurement and television set devices that monitor television channel and time, NMR obtains rating estimates for television programs in a given media market. Advertisements appearing in a given program are assigned the audience ratings for that program. As explained by Szczypka et al. [14], ratings provide an estimate of the percentage of households with televisions watching a program or advertisement in a given media market. For example, if 20,000 households out of a total of all 100,000 households in a media market were tuned into the same program, the program would receive a 20 rating, meaning that it was seen by 20% of households in the media market.

Rating points for a program are summed over a specified time interval and are called gross rating points (GRPs), which provide estimates of audience size for all households [14]. GRPs are often expressed in exposures where 100 GRPs is equal to an average of one exposure per person in the target population. For example, if an advertisement were to receive 200 GRPs over a monthly interval
in a given media market, this means that the average household within the media market viewed that advertisement twice during the month. The actual exposure in any given household may be more or less than two exposures during that month; however, these aggregate estimates are useful for comparing average relative exposures between advertisers and geographic regions and over time [14]. The GRP exposure measures presented in this paper are per 5000 GRPs exposed in 1999 and 2000 combined, which translates into 50 additional exposures per person during this 2-year period or about two exposures per month.

We focused on only one type of advertisement for the purposes of this paper. We examined state tobacco control advertisements, which were anti-tobacco advertisements sponsored by state health departments. The content and type of advertisement are derived from the NMR database of television programming and advertisements. State tobacco control advertisements were not consistently coded and reported prior to 1999; therefore, only GRP data from 1999 and 2000 are used in this paper. All COMMIT participants residing in a given media market are assigned the total GRP level for state tobacco control advertisements for 1999 and 2000 combined.

Because aggregate GRP data assigned at the media market level may not reflect actual exposure for a given individual, we further stratified all analyses based on responses to the following question obtained in the 2001 follow-up survey, ‘How much increase has there been in the amount of information in the media on the dangers of smoking? (no increase or a decrease, it increased a little, it increased moderately, it increased a lot)’, in an effort to better isolate those participants who may have been more exposed to television media messages.

Table I shows descriptive data on relevant GRP exposure and cessation for the 15 COMMIT communities included in this analysis.

Measures
A participant was defined as a former smoker if he/she reported having smoked 100 cigarettes in his/her lifetime and also reported he/she had not smoked any cigarettes in the 6 months prior to the 2001 interview. All former smokers were asked the year in which they quit smoking, and they are defined as former smokers in that and subsequent years and current smokers in previous years. Additional baseline variables used as control variables included gender (male or female), age in 2001 (35–44, 45–54, 55–64, ≥65 years), race/ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic; other) and cigarettes smoked per day in 1993 (<15, 15–24, 25+).

Analysis
Percentages of smokers who reported successfully quitting by 2001 were reported overall and by community and the Spearman rank correlation coefficient was used to compare the agreement between community-level anti-tobacco GRPs and cessation. Logistic regression analysis was performed to assess the association between level of state anti-tobacco media exposure with smoking cessation for the entire sample, as well as stratified by those who reported ‘a lot of increase’ in anti-tobacco media and those who did not, adjusting for the covariates enumerated above. To account for possible response bias due to differential rates of attrition, the 2001 survey data were weighted to the age, sex, race/ethnicity and community distributions of the baseline 1988 survey population smokers who agreed to be re-contacted in the future. Weighted data are presented, although the weighted and unweighted results were very similar.

Human participant protection
Institutional ethics review was obtained for all aspects of the data collection.

Results
Among 2061 smokers in 1999 and 2000, 12.0% (n = 247) had quit by the time of the 2001 survey. Combined GRPs for 1999 and 2000 for state tobacco control media ranged from 41 (Greensboro-High Point, NC, USA) to 17 481 (Boston, MA, USA). The quit rate for those in communities
above the median for state anti-tobacco GRPs was 12.9% compared with 11.0% for those below the median (Spearman rank correlation statistic = 0.52, \( P = 0.047 \)). The median is 1218 GRPs (see Table I).

After controlling for other factors related to cessation, the relative risk for quitting was estimated to be 10% higher (95% CI = 0.98–1.24) for every 5000 GRPs of exposure to state anti-tobacco advertising between 1999 and 2000, which translates into about two additional exposures per person per month. When restricted to those who were more exposed to these media (those who felt the level of anti-tobacco information in the media has increased ‘a lot’ in their community), the association was larger and statistically significant (RR = 1.19, 95% CI = 1.03–1.38) with no association among those who reported lower levels of increasing anti-tobacco information in the media (Table II).

### Discussion

Results from this paper are consistent with the finding that increased exposure to state anti-tobacco media increases smoking cessation rates, even after controlling for other factors that are related to smoking cessation.

The increased cessation rates in those communities exposed to higher levels of state-sponsored anti-tobacco television advertising are consistent with reports that show comprehensive state tobacco control programs, which include a well-funded anti-tobacco advertising campaign, are effective in reducing smoking rates in the population [1–7, 15, 16]. The amount of anti-smoking advertising varied widely across states. A simple comparison of cessation rates in states above and below the median for advertising GRPs revealed a higher quit rate in states above the median. Using GRPs as a continuous variable in a logistic regression model revealed an overall positive relationship between the level of advertising and cessation rates which, while not statistically significant at the <0.05 level, is in the predicted direction. Support for the causal nature of this relationship is found in the observation that the relationship between advertising exposure was stronger among those who reported seeing a lot of increase in the dangers of smoking in the media.
These results help to quantify the relationship between the amount of anti-tobacco media exposure and cessation rates in adult smokers. These data suggest that for every 5000 GRPs spent by states on anti-tobacco advertising over a 2-year period, or about two anti-tobacco advertisements per month, the quit rate among adult smokers increased by ~10%. The estimated magnitude of effect from this study is similar to the estimated prevalence rate reduction estimated by Friend and Levy [17] in a recent meta-analysis of anti-tobacco campaigns. However, the 10% boost in quit rates we estimate is less than the 40% boost for cessation-oriented media campaigns estimated by Levy et al. [18] in a recent review of the impact of mass media on cessation rates.

While it is often difficult to separate out the effect of specific program components, anti-tobacco advertising is one of the main elements of comprehensive tobacco control programs recommended by the Centers for Disease Control and Prevention [1]. Further, tobacco control media can indirectly promote policy changes such as increase in cigarette excise taxes or passage of clean indoor air law by changing societal norms [19].

The primary advantage the present study has over previous studies is that prospective data on smoking cessation are examined in a large sample with diverse exposures to anti-tobacco advertising. The finding of higher cessation rates as the level of GRP exposure increased in this study lends further evidence that the observed relationship is causal. The finding that this effect was greater among those who reported a lot of increase in the amount of media on the dangers of smoking, which we hypothesize are people who are more likely to be watching television and be exposed to anti-tobacco advertisements, is expected if the underlying hypothesis is correct.

While there are several unique strengths of this study, the following key limitation should be noted, which is that we did not have individual level media exposure but used aggregate data for the entire media market and applied it to individuals. This should lead to an underestimate of effects in the general population of smokers. We have stratified our findings based on each individual’s self-report of how much increase there has been in the media on the dangers of smoking under the assumption that those who report a lot are more likely to be exposed to television media. This could be problematic because those who are thinking about quitting or attempting to quit may have more of a reason to remember this type of advertising, and report it as being prominent. While this method is imperfect, it does allow us to separate those who may not have seen any of these advertisements from the rest of our sample.

Another potential limitation is that other factors may account for the observed findings. For example, state-level tobacco control policies often accompany state tobacco control media campaigns.

<table>
<thead>
<tr>
<th>Smoking cessation per 5000 units of state-sponsored GRPs</th>
<th>Among those who feel media information has increased</th>
<th>Among those who do not feel media information has increased</th>
<th>Among all smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR</td>
<td>95% CI</td>
<td>RR</td>
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</tr>
<tr>
<td>Lower</td>
<td>Upper</td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>1.19*</td>
<td>1.03*</td>
<td>1.38*</td>
<td>0.99</td>
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</tbody>
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Sample sizes for the two stratified samples are not equal to the overall sample size of 2061 because of missing data for stratification variable. *P = 0.017.

Table II. Relative risk for smoking cessation from a logistic regression model controlling for demographic and smoker characteristics
In this study, state cigarette excise taxes increased in California and New York during the study period, but they remained constant in the other states. To assess whether the relationship between state tobacco control television media exposure and quitting was confounded by the tax increases in these states, we restricted our analysis to the communities in the states that did not experience tax increases. The results were virtually unchanged from the overall results, which suggests that the GRP and cessation association is not due to the adoption of other tobacco control policies like tax increases.

Anti-tobacco advertising should educate smokers about the risks inherent in cigarette smoking and hopefully motivate smokers to make a quit attempt. Recent studies have documented that smokers are misinformed about the risk of smoking and methods for quitting smoking [20–24], so there remains a need for public education campaigns. The positive association observed between exposure to state-sponsored anti-tobacco television advertising and increased rates of quitting among adult smokers in this study adds to the growing body of evidence that supports the need for state governments to continue investing in anti-tobacco advertising campaigns.

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Conflict of interest statement

None declared.

References


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