Understanding the Impact of Tobacco Control Media Campaigns: Refining Old Models, Developing New Ones, and Applying Lessons to Other Health Promotion Media Campaigns

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Overview

- A little bit of background: media campaigns and smoking
- Present analyses of the relationship between adult smoking and exposure to anti-smoking TV ads
  - Data, Methods, and Results
- Discuss some related analyses & next steps
  - Anti-Drug
  - Obesity
  - Pharmaceutical
  - New Media
Background: TV Advertising and Smoking

- Tobacco remains the largest killer in US and world.
- Following the Master Settlement Agreement between the tobacco industry and 46 states (in 1998), there was a huge increase in the number and type of smoking-related television advertisements.
- Increases in number and types of smoking related ads has resulted in variation in exposures over time and between communities: a natural experiment.
- Most previous studies involved research demonstration projects, effects of tobacco control advertising at the state level (eg. CA, MA, FL) or national level (Fairness Doctrine; American Legacy Foundation).
Counter-Marketing Campaigns in the US: 37 State Campaigns + Legacy (national)

Defined as at least ½ exposure pure month.
37 states and the District of Columbia over a ten year period (1999-2008)
Other Smoking-Related Ads

- **Pharmaceutical Cessation Aids**
  - (NRT, Zyban)
  - Early 1992-present
  - 1996 NRT goes over-the-counter (OTC)

- **Philip Morris’s Television Campaigns**
  - Dec 1998  Think. Don’t Smoke. (Youth)*
  - Jul 1999  Talk. They’ll Listen. (Parent)*
  - Jul 2000  Things are Changing (corporate image)
  - Jul 2003  [www.philipmorrisusa.com](http://www.philipmorrisusa.com) (corporate image)
US Annual Average Smoking-Related Television Advertising Exposure Levels, by Sponsor
Previous research on youth showed:

- Tobacco and pharmaceutical companies are the largest smoking-related advertisers, even in states with large media campaigns (Wakefield, Szczypka, Emery et al., 2006. *Addiction*).

- Anti-smoking ads are associated with smoking-related attitudes, beliefs, and behavior (Emery, et al., 2005, *JPAM*).

- Tobacco Industry youth-targeted ads have little affect on youth; the parent targeted ads may be associated with harmful boomerang relationships among older youth (Wakefield, Terry-McElrath, Emery, et al., *AJPH*, 2006).

- Recent state budget crises that have resulted in severe cuts or elimination of tobacco control media campaigns may result in longer-term costs.

- There is very little evidence about advertising and adult smoking.
Tobacco Advertising Research Hypotheses

- Exposure to anti-smoking (state and Legacy sponsored) ads is associated with:
  - Increased anti-smoking attitudes and beliefs
  - Reduced smoking

- Exposure to Pharmaceutical or Tobacco Industry ads on TV is associated with:
  - Smoking-related attitudes, beliefs and behaviors (direction unclear)

- Exposure to one type of ad will interact with exposure to another type
  - Industry ads will counteract the effects of public health ads
  - Legacy and state ads will reinforce each other
Study Design

Exposure Measures: Nielsen Data

- **Type:** Single occurrence (every commercial)
- **Length:** 1999 – 2009
- **Breadth:** 75 Designated Media Areas (DMAs)

**Size of Data Set:** Approximately 3+ million individual ad occurrences

**Variables for each ad occurrence:**
- Date and Time
- Market and Station (Network, Local Affiliate, Cable)
- Sponsor, Creative Title, Program Title
- Gross Rating Points (GRPs) for Total Television Households
- Targeted Rating Points (TRPs) Total Teens 12 –17
Interpretation of Ratings

- Customary unit for quantifying exposure to ads

- If one percent of the audience sees an ad one time, the ad earns one GRP or TRP

- Aggregated monthly, by media market, to estimate the average number of times/month an ad is exposed to an audience in that market
  - 100 GRPs = 1 potential exposure (on average)
  - 250 GRPs = 2.5 potential exposures (on average)

- Exposures are averages across the population, depending on viewing habits
Study design: outcome measures

- Current Population Surveys-Tobacco Use Supplements
  - approximately 56,000 households per wave.

- Measures
  - Current smoking (any in past 30 days)
  - Someday smoking
  - Everyday smoking
  - Amount smoked
  - Planning Quit Attempt in next 30 days
Basic Model

Smoking Behavior\(i\) = \(f[GRP_{m(j,i)}, \text{ personal characteristics}_{i}, \text{ state tobacco policies}_{s(i)},]\)

- Personal Characteristics (controls): age, race, gender, (time), education, marital status, employment status (full-time indoor, part-time indoor, not in labor force, part/full-time home, unemployed), geographic region

- State Tobacco Policies: Smokefree Air Index, real average price of cigarettes, ‘baseline’ state-level smoking prevalence
# Models of Smoking Behavior

<table>
<thead>
<tr>
<th></th>
<th>Current v. Non-Current(^1) N=433232 (p-value)</th>
<th>Intention to Quit(^1) N=65747 (p-value)</th>
<th>Number of Cigs/Day(^2) N=298365 (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State(^3)</td>
<td>0.97 (0.0002)</td>
<td>1.05 (0.0061)</td>
<td>NS</td>
</tr>
<tr>
<td>Legacy(^3)</td>
<td>0.96 (0.0032)</td>
<td>1.11 (0.0025)</td>
<td>NS</td>
</tr>
<tr>
<td>Pharm(^3)</td>
<td>0.97 (&lt;-0.0001)</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Tob-Industry(^3)</td>
<td>1.04 (&lt;0.0001)</td>
<td>1.09 (0.0133)</td>
<td>NS</td>
</tr>
<tr>
<td>Cigarette Price ($1 increment)</td>
<td>0.95 (0.0015)</td>
<td>1.12 (0.0099)</td>
<td>-0.06 (&lt;0.001)</td>
</tr>
<tr>
<td>SFA score</td>
<td>0.998 (0.0015)</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

\(^1\)Odds Ratio from logistic regression models
\(^2\)Regression Coefficient from negative binomial regression model
\(^3\) Exposure measured by 10 recency-weighted exposures for four months prior to survey date
Significant Interaction between Legacy and State Ads

![Graph showing the interaction between Legacy-sponsored and State-sponsored ads GRP/100 and probability of smoking. The graph includes lines for different percentages of state-sponsored ads GRP/100, with 0.0 (0%), 0.2 (25%), 2.9 (50%), and 4.5 (75%).]
Summary of Fixed-Effects Models

- More of the good stuff is generally good
  - State, Legacy, and Pharmaceutical ads are associated with lower odds of smoking
    - Tobacco Industry ads are associated with higher odds of smoking
  - State, Legacy, and Tobacco Industry ads are associated with higher odds of having intentions to quit
  - There appears to be no relationship between ads and the amount smoked by current smokers
  - Legacy and State ads reinforce each other
Random Effects Models allow us to account for multi-level data.

- Individual level data combined with media-market level data
- Correlations between individuals within a media market

\[
\text{Smoking} = \beta_{o(m)} + \beta_{1(m)} \text{GRP} + \beta_2 \text{Personal} + \beta_3 \text{Tobacco Control} + u
\]
Early findings of Random Effects Models

- There is significant variance across media markets in the relationship between exposure to ads and adult smoking:
  - Intercept: Initial smoking prevalence varies
  - Slope: The effect of the ads varies
Illustration of Variance in Ad Effects

- Average Effect of Ads
- Effect of Ads on Specific Markets—m1, m2, m3
- Smoking
- Exposure to Anti-smoking Ads
What explains the differences we see?

- State policy environment
  - Cigarette prices
  - Smokefree Air laws
  - Size and length of media campaigns

- Population characteristics
  - Proportion of full-time indoor workers
  - Proportion of population under 25 years old
  - Proportion non-white
  - Average education level

- What do you think???
Maybe it’s something about the ads...

- What are salient characteristics of ads?
  - What do you think???

- Is it possible to reliably code for ad characteristics?
  - Do you think it is??

- Partnered with Joseph Cappella, from the Annenberg School of Communications at the University of Pennsylvania to develop and validate codes
Answering the Questions Incrementally: Describing Ad Characteristics

- No small endeavor: Nielsen data include over 2000 individual state-sponsored ads—so we prioritized those with greatest exposure levels.
- Need to match actual ads in CDC archives to Nielsen data, and then rank by GRPs.
- When the ads are ranked, the top 75%, or so, of the total ratings points represented a manageable number of ads (approximately 150).
Ad Characteristics

General Information
- Length of ad
- Target Audience
  - youth v. general
  - pregnant smokers
  - race/ethnicity
- Quitline direction (phone and/or website)
- Sound Quality
- Picture Quality
Ad Characteristics

Message Themes

- **Health**
  - Disease and Death
  - Cosmetic damage

- **Quitting**
  - Positive frame of quitting
  - Strategy of Quitting

- **Negative Tobacco Industry**
  - Tobacco Industry Marketing tactics
  - Selling Disease and Death

- **Endangers others-secondhand smoke**

- **Social Stigma of Smoking**
  - Endangers others-burden
  - Smokers’ negative life circumstances
  - Refusal skills model
Ad Characteristics

Message Sensation Value

- Animation
- Cuts
- Edits
- Faces
- Special visual effects
  - E.g. computer manipulation of images; blood
- Slow Motion/Fast Motion
- Unusual colors
- Intense moments
- Sound Saturation
- Music
- Sound Effects
- Slow Voice
- Fast Voice
Ad Characteristics

Message Sensation Value-Content
- Acted-out v. Talking Head
- Narrative
- Unexpected format
- Surprising/twist ending

Death Appeals

Smoking Cues
Reduced and Combined messages for analytic purposes

- Endangers Others - Secondhand Smoke
- Health Effects = Disease and Death with Endangers Others - Burden
- Industry Marketing = Marketing Tactics with Selling Disease and Death
- Strategy for Quitting
Early results: suggestive, but don’t take it to the bank yet...

- **Tobacco Control Policy**
  - Higher cigarette prices and stronger SFA laws associated with lower variance in slope of GRPs
  - No significant interaction between cigarette prices or SFA laws and slope of GRP

- **Population Characteristics**
  - Higher proportion of full-time workers associated with lower variance in slope of GRPs
  - Higher proportion of youth (<25) associated with steeper slope of GRPs
  - Higher proportion of non-white associated with steeper slope of GRPs
More early results

- Higher proportion of Health Effects and Second Hand Smoke ads are associated with lower variance in slope of GRPs

- Higher proportion of SHS ads associated with steeper slope of GRPs

- Higher proportion of narrative format ads associated with flatter slope of GRPs
Take away ideas, so far...

- There are lots of campaigns that emphasize secondhand smoke
- Health effects messages are next most common, followed by industry marketing, and strategy for quitting
- Second Hand Smoke may be an impactful message
- Dominance of a single message in a campaign may blunt the effect of total amount of ads
Limitations and next steps

- We still haven’t really figured out WHY the effect of ads varies across markets
  - What do you think???

- Only most highly exposed ads were coded for message and other characteristics

- Many other ad characteristics to consider
  - Message sensation value
  - What would you recommend considering next?
A similar problem: Anti-Illicit Drug Advertising

- Partnership for a Drug-Free America launched first national anti-drug ad campaign in 1986

- Office of National Drug Control Policy launched massive media campaign in 1998, with nearly $1 Billion authorized over five years
  - Early evaluations of ONDCP campaign suggested no effect, or worse—detrimental effect
  - After 2002, Marijuana Initiative began
  - 2004-5 Peer intervention ads introduced
  - 2006 Another re-focus—”Above the Influence”
Exposure levels for PDFA and ONCDP Ads
Relationship between exposure and drug-use-related outcomes

- Higher exposure to total anti-drug ads was associated with higher recall
  - For middle school students, significant relationship only for Partnership ads

- Partnership Ads
  - Higher disapproval of MJ for HS youth
  - Higher perceived risk of MJ for HS youth
  - Lower perceived availability of MJ for HS youth
  - Lower MJ and IOTM use for HS youth

- ONDCP Ads
  - Lower perceived risk (especially during 2003-2006)
  - Lower disapproval
Does Content Matter?

- MJ-focused ads more effective among Middle School students but potentially harmful among High School students.

- More research necessary to understand effect of content and amount of exposure.
Framing the Problem: Is Obesity like Smoking? YES

- **Public Health ‘epidemic’:**
  - Obesity associated with premature death, type 2 diabetes, heart disease, stroke, hypertension, gallbladder disease, osteoarthritis, sleep apnea, asthma, breathing problems, cancer, high blood cholesterol, complications of pregnancy, menstrual irregularities, hirsutism, stress, incontinence, and depression.

  - Among adults in 1999-2002
    - 65% (!) were overweight (BMI > 25)
    - 30% were obese (BMI>30)
    - 5% were morbidly obese (BMI > 40)
  - Among children (6-19 years old)
    - 31% at risk for overweight or overweight (BMI≥85th percentile)
    - 16% overweight (BMI≥95th percentile)
  - Problem varies by race/ethnicity.
Federal and state governments in the US have recently launched anti-obesity advertising campaigns.

- In 2000, anti-obesity ads aired in one media market (San Diego)
- In 2001, anti-obesity ads aired in the five California media markets
- In 2002, the CDC’s VERB campaign was launched across 75+ media markets nationally, and 3 additional state-level campaigns aired across 3 new markets
- In 2003, the VERB campaign continued to run and 5 more states launched campaigns—bringing the total of state campaigns to nine.
Framing the Problem, continued: Is Obesity like Smoking? NO

- Obesity is not a single behavior:
  - Eating
  - Physical activity
  - Genetics
  - Culture
  - Work/Transportation
  - Built Environment: access to and cost of food, transportation, opportunities for physical activity

- Even media environment is more complex:
  - Ads for food: fast food, groceries, restaurants...
  - Ads about other obesity-related behaviors (gym membership, active cruises?...)
Environmental Influences on Physical Activity and Healthy Eating

- **Agriculture and Food Supply System**
- **Policies**
  - **Characteristics of the Built Environment**
    - **Availability**
    - **Quality**
  - **Access**
    - **Transportation**
    - **Neighborhood Safety**
    - **Cost**
  - **Individual**
    - Exposure to nutrition education
    - Exposure to physical activity education
    - SES
  - **Social Network**
    - Family
    - Peers
    - Providers
  - **Media**
    - Mass Media
    - Community Media
  - **Community Social Norms**
- **Advocacy**
- **Healthy Eating**
- **Regular Physical Activity**
- **Healthy Living**
Moving Forward Anyway: Media Data

- GRPs and TRPs for state and federally sponsored anti-obesity advertising for 75 media markets for 1999-2003

Adolescents 12-17 (TRPs)
State Anti-Obesity v. Federal Verb

- State
- Verb
Moving Forward Anyway:  
A different take on the Media Data

<table>
<thead>
<tr>
<th>year</th>
<th>Active</th>
<th>Healthy Eating</th>
<th>Both</th>
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<tbody>
<tr>
<td>2000</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>1860</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>2003</td>
<td>3559</td>
<td>24</td>
<td>34</td>
</tr>
</tbody>
</table>

Looked for other messages: don’t eat junk; don’t be a slug.
Basic Model

- Obesity-related Behavior$_i = f[\text{personal characteristics}_i, \text{built environment}_i, \text{TRP}_m(i)]$

- E.g., DV= vegetable eating; exercise; BMI...

  - Personal Characteristics: grade, year, gender, race/ethnicity, earned income, average parental education, job, sports, vegetable eating(?), exercise(?)

  - Built Environment: non-paid exercise opportunities, paid exercise opportunities, fast-food outlet density, grocery prices...
Future Directions

- Simple description of media environment: what’s out there now:
  - Public health ads
  - Food (cereal, snacks, candy, chips, cookies, grocery promotions...)
  - Soda/Pop, sugary beverages
  - Fast food
  - Restaurants
  - Sports club promotions

- Play with basic models

- Further characterize public health ads: message content, targeting, length...
Another Related Area—Pharmaceutical Advertising

- Fourth most common TV ads
- Do they educate consumer or drive demand and health care costs?
- Evidence so far is MIXED
- Nielsen data allow us to look across drug categories
- Also important to look at content
How relevant is TV advertising in a Rapidly Changing Media Environment?

- TV remains dominant medium—Americans watch an average of 4 hours of TV/day!
- Internet use nearly universal—60% of homes have broadband!
- The way we watch TV has changed!
  - In 2006 25% of TV time shared with Internet use
  - DVRs and other sources of video content increasingly common
- Need to account for exposure, seeking and exchange of health-related information—and interaction of each!