Reductions in smoking prevalence and cigarette consumption associated with mass-media campaigns

Karen Friend and David T. Levy

Abstract

This paper examines reductions in smoking prevalence and cigarette consumption associated with state and local mass-media campaigns. We review the findings of the empirical literature on campaigns targeted at the general population. We then discuss the findings on state- and community-level youth-oriented campaigns. The results suggest that well-funded and implemented mass-media campaigns targeted at the general population and implemented at the state level, in conjunction with a comprehensive tobacco control program, are associated with reduced smoking rates among both adults and youth. Studies of youth-oriented interventions specifically have shown more mixed results, particularly for smaller, community-level media programs, but they indicate strong potential to influence underage smoking rates. We conclude by examining issues that warrant additional research. The scale and duration of expenditures, the content of ad messages, and other tobacco control polices are aspects of media programs that may help explain differences among study results. In particular, tobacco control polices that are implemented during the campaign often make it difficult to identify the specific influence of media campaigns alone.

Introduction

Anti-tobacco media campaigns, often called counter-advertising campaigns, were originally aimed at countering the effects of tobacco advertising by cigarette manufacturers. Their focus was generally to change individual behavior by discouraging smoking. More recent campaigns have also attempted to decrease smoking rates by changing social norms through generating public support for various tobacco control policies, such as new tax initiatives or clean indoor air laws (Dorfman and Wallack, 1993; Blum and Solberg, 1996). By 1998, Arizona, California, Florida, Massachusetts and Oregon had already implemented major mass-media campaigns as part of larger programs directed at reducing tobacco use. With the recent tobacco settlement (National Association of Attorneys General, 1998), many more states and the American Legacy Foundation are in the process of implementing additional media campaigns.

Given the vast expenditures being dedicated to mass-media campaigns, it is important to discern their influence on smoking rates in the general population and on specific demographic groups, especially youth. In order to implement more effective programs, it is also critical to understand tobacco control policies of the states in which they are implemented and the characteristics of the population targeted. Farquhar stated that "media has the potential therefore to influence the health of citizens of our post-industrial state, and it is
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imperative that we understand both the positive and negative aspects’ (Farquhar, 1984).

Recent reviews by the Institute of Medicine (Institute of Medicine, National Resource Council, 2000) and Wakefield and Chaloupka (Wakefield and Chaloupka, 2000) also examined media campaigns, but their main focus was on comprehensive state tobacco control programs. In contrast, we attempted, to the extent possible, to isolate reductions in smoking rates associated with state media programs. Unlike those previous reviews, we also considered evidence from community-based programs. Moreover, our review discusses the factors that must be considered in identifying the influence of media campaigns.

The ultimate goal of a tobacco use prevention mass-media campaign is to reduce the prevalence of smoking, and thereby decrease smoking-related morbidity and mortality (Levy and Friend, 2001). Decreases in smoking rates are expected to result from changes in social norms, and in knowledge, attitudes and beliefs regarding smoking, the more direct target of most media campaigns. Changes in social norms are critical in influencing changes in smoking behaviors (Rundall and Bruvold, 1988; Waldren, 1991; Levy and Friend, 2000).

The central focus of this paper is to examine differences in smoking behavior between the time period before and after the media campaign was implemented. More direct targets, such as the extent to which campaigns increase positive smoking-related attitudes, beliefs, knowledge and awareness, are also considered because they ultimately affect smoking behavior, the ultimate campaign target, but are not the main focus of attention in this review. By concentrating on the changes in smoking rates associated with media campaigns, this review provides a comparison of results across studies and a measure of the relative success of the various interventions.

Methods

Studies for this review were identified using various Internet searches: Centers for Disease Control and Prevention’s Office of Smoking and Health’s Web site, Medline, and other computerized databases. We also reviewed references identified from bibliographies of pertinent articles and books, and elicited suggestions from experts in the field of tobacco control. Independent extraction was conducted by multiple observers. For the sake of comparability, the analysis was primarily limited to studies conducted since Flay’s review (Flay, 1987) and to studies conducted in the US. The final review includes investigations published in peer-reviewed journals or unpublished final reports that examined the associations of state and local mass-media policies with smoking rates within the general population and among youth.

To combine the results of the studies in a rigorous manner, meta-analytic techniques were considered. Sufficient data, however, in terms of standard errors and adequate control groups, were often not available for the outcome variables of interest. In addition, differences in the way that media campaigns and concurrent policies were implemented made aggregation of the results from different investigations of questionable validity. Instead, a more qualitative review was conducted. Part of the goal of this review was to supplement the individual studies to provide adequate controls and to develop meaningful comparisons among studies.

We limited the review primarily to studies that examined reductions in smoking behavior. In the empirical literature, changes in smoking behavior were usually measured in terms of the change in smoking prevalence and/or cigarette consumption. Unless otherwise indicated, smoking prevalence was defined as adults who have smoked 100 or more cigarettes in their lifetimes and are current smokers, or, for youth, having smoked on 1 day or more in the past 30 days. Smoking prevalence was measured in terms of the number of smokers as a percent of the population (usually 18 and above). Cigarette consumption was also measured as a percent of the population as per capita cigarette consumption (PCC). A decrease in the prevalence of smoking may occur either through increased cessation or reduced smoking initiation. Changes in PCC may result from changes in the number of
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smokers per capita (prevalence) and changes in the average quantity smoked per smoker. Changes in the latter are important because decreases in quantity smoked per smoker appear to lead to future cessation (Hymowitz et al., 1991, 1997; Hughes et al., 2000).

For purposes of comparing the different media campaigns and their associated tobacco control programs, whenever possible, their relationship to smoking behavior was measured in percentage terms as the reduction in the smoking rate relative to its initial level. To control for other factors influencing smoking rates, percentage changes in the smoking rate over the same time period in a comparison area were subtracted from those in the area under examination, which we refer to as ‘net decline’ (or ‘net increase’, where appropriate). For this review, these figures were calculated by the study authors (unless provided in the study) by subtracting the percentage change in the smoking rate of all states without a mass-media campaign or of the entire US from the percentage change in the smoking rate of the state under investigation.

As is typically true in such research, even with a control group, it is difficult to establish a causal role between the policies and reductions in smoking rates. The problems are compounded in the case of media campaigns because other tobacco policies, including tax increases and clean air laws, often occur around the same time as the campaigns are implemented. These other policies are typically part of a more comprehensive campaign (Institute of Medicine, National Resource Council, 2000; Wakefield and Chaloupka, 2000). Thus, the implementation of other tobacco use prevention policies may make it difficult to determine the specific effect of a media campaign alone. Given this limitation, we discuss, whenever possible, how authors have tried to distinguish the impact of media policies from other policies.

We distinguished media campaigns that were directed at the entire smoking population from those directed primarily at youth. Media campaigns directed at all smokers are considered first. Next, youth-related effects of general population campaigns are discussed. Finally, youth-oriented campaigns, which generally focus on initiation since the vast majority of smokers begin smoking when they are young (US Department of Health and Human Services, 1989), are presented.

### Empirical literature review of mass-media campaigns directed at the general population

In this section, the literature on the associations between campaigns, both state and local, and smoking prevalence PCC is reviewed. Although these interventions were targeted at the general population (Wakefield and Chaloupka, 2000) and not specifically directed at minors, we examine their influence on both groups. The estimated rates of change in adult smoking prevalence and PCC are presented in Tables I and II.

#### State-level campaigns

**California**

California launched one of the first widespread state efforts to implement strong anti-tobacco interventions. Though their smoking rate was already lower than the US average, California voters passed Proposition 99 in 1988, which increased excise cigarette taxes from $0.10 to $0.35 per pack. Revenues from the tax hike were earmarked towards the establishment of the California Tobacco Control Program (CTCP). The CTCP met with considerable political resistance, despite the fact that it was strongly supported by voters. Following tobacco industry pressure on various legislators, the governor decreased the program’s funding. Legislation passed in 1991 and 1994 redirected funds from tobacco control to direct medical services. Overall, funds declined steadily from $131.3 million in 1989–1990 to a low of $54 million by 1995–1996, although they increased to $130.5 million by 1996–1997 (Pierce et al., 1998a). They increased further to $140.7 million in 1997–1998, but declined to $105.8 million in 1998–1999 (Independent Evaluation Consortium, 2001).

The program was initially directed at increasing cessation, but later targeted its efforts at reducing exposure to environmental tobacco smoke (ETS),
Table I. Changes in smoking prevalence in the general population associated with state mass-media campaigns

<table>
<thead>
<tr>
<th>Study</th>
<th>State</th>
<th>Years</th>
<th>Smoking prevalence (%)</th>
<th>Percentage change1 (%)(^a)</th>
<th>Net percentage change2 (%)(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC (1996a)</td>
<td>Massachusetts</td>
<td>1990–1992</td>
<td>23.5 (± 1.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>California</td>
<td>1990–1992</td>
<td>20.1 (± 0.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1990–1992</td>
<td>24.1 (±0.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Massachusetts</td>
<td>1993–1995</td>
<td>21.3 (±1.2)</td>
<td>–9</td>
<td>–6</td>
</tr>
<tr>
<td></td>
<td>California</td>
<td>1993–1995</td>
<td>17.4 (± 0.9)</td>
<td>–13</td>
<td>–10</td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1993–1995</td>
<td>23.4 (±0.2)</td>
<td>–3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td></td>
<td></td>
<td>–9</td>
<td></td>
</tr>
<tr>
<td>Pierce et al. (1998b)</td>
<td>California</td>
<td>pre-1989</td>
<td>23.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1989–1993</td>
<td></td>
<td>18</td>
<td>–22.7</td>
<td>–11.7</td>
</tr>
<tr>
<td></td>
<td>1994–1996</td>
<td></td>
<td>18</td>
<td>0</td>
<td>+3.0</td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>pre-1989</td>
<td>26.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1989–1993</td>
<td></td>
<td>23.3</td>
<td>–11.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994–1996</td>
<td></td>
<td>22.6</td>
<td>–3.0</td>
<td></td>
</tr>
<tr>
<td>Michigan Department of Public</td>
<td>Michigan</td>
<td>1991</td>
<td>29.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1992</td>
<td></td>
<td>27.9</td>
<td>–4</td>
<td></td>
</tr>
</tbody>
</table>

\(^{a}\)Percentage difference in rates between the later year/time period and the earlier year/time period within a given location (i.e. \([(\text{rate \#1}) − (\text{rate \#2})]/(\text{rate \#1})\)).

\(^{b}\)Percentage difference in rates between the later year/time period and the earlier year/time period within a given location, minus the percent change among the rest of the US (i.e. \([(\text{rate \#1}) − (\text{rate \#2})]/(\text{rate \#1})\) – \([(\text{US rate \#1}) − (\text{US rate \#2})]/(\text{US rate \#1})\)).

Reducing youth access to cigarettes and countering pro-tobacco messages. Specific CPTP elements included a statewide mass-media campaign, competitive grants program, school-based prevention and cessation programs, community programs and coalitions, health care provider education, restrictions on advertising and promotions, and clean indoor air laws (Wakefield and Chaloupka, 2000).

The media campaign was launched in 1990. Although youth were the target of some messages, the campaign was directed at changing norms, thereby influencing tobacco use by adults. In particular, attention was directed toward manipulative practices by the tobacco industry and the dangers of secondhand smoke (Pierce et al., 1998a). In 1997–1998, the general focus of the campaign was on ETS (44% of expenditures), followed by countering pro-tobacco influence (34% of expenditures) and cessation (20% of expenditures) (Independent Evaluation Consortium, 2001). Per capita annual expenditures on the campaign averaged about $0.50 between 1990 and 1993, but fell to about $0.35 between 1994 and 1996, and then increased to about $0.90 in the period between 1997 and 1998. Studies have indicated high levels of media awareness, even among youth (Independent Evaluation Consortium 1998, 2001; Pierce et al., 1998a).

Pierce et al. examined California’s smoking prevalence relative to the 1989 baseline rates (Pierce et al., 1998b). Smoking prevalence fell 22.7%, from 23.3% before 1989 to 18% between 1989–1993 \((P < 0.001)\), compared to 11% in the rest of the nation, representing a net decline of 11.7% over an average 3-year period. The smoking prevalence rate stayed constant at 18% from 1994–1995 in California, whereas it fell slightly in the rest of the nation. Smoking prevalence in California stabilized between 1989–1993 and 1994–1996, with a rate of change of 0.01% \((P < 0.001)\),
Reductions in smoking prevalence associated with mass-media campaigns

Table II. Changes in PCC in the general population associated with mass-media campaigns

<table>
<thead>
<tr>
<th>Study</th>
<th>State</th>
<th>Years</th>
<th>PCC (packs/year)</th>
<th>Percentage change (%)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Net percentage change (%)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC (1996a)</td>
<td>Massachusetts</td>
<td>1992</td>
<td>117</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1992</td>
<td>131</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Massachusetts</td>
<td>1996</td>
<td>94</td>
<td>−20</td>
<td>−14</td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1996</td>
<td>123</td>
<td>−6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td>81</td>
<td>−31</td>
<td>−17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>California</td>
<td>1992</td>
<td>89</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td>72</td>
<td>−19</td>
<td>−5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1992</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td>121</td>
<td>−14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td>131</td>
<td>−7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pierce et al. (1998b)</td>
<td>California</td>
<td>pre-1989</td>
<td>116</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1989–1993</td>
<td>78</td>
<td>−33</td>
<td>−16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994–1996</td>
<td>72</td>
<td>−8</td>
<td>−9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>pre-1989</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1989–1993</td>
<td>125</td>
<td>−17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1994–1996</td>
<td>126</td>
<td>+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1994–1995</td>
<td>−8</td>
<td>−2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1993–1996</td>
<td>−0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oregon</td>
<td>1996–1998</td>
<td>−11.3</td>
<td>−10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rest of US</td>
<td>1996–1998</td>
<td>−1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Percentage difference in rates between the later year/time period and the earlier year/time period within a given location (i.e. \([(rate #1) - (rate #2)]/(rate #1))\).

<sup>b</sup>Percentage difference in rates between the later year/time period and the earlier year/time period within a given location, minus the percent change among the rest of the US (i.e. \([[(rate #1) - (rate #2)]/(rate #1)] - [[(US rate #1) - (US rate #2)]/(US rate #1))\]).

compared to the −1.06% rate of change between pre-1989 and 1989–1993 (<i>P < 0.001</i>). By contrast, the rate of change in the rest of the US in the former time period was −0.28% (<i>P < 0.001</i>) and −0.57 in the latter period (not significant).

The Centers for Disease Control and Prevention examined the effects of the California program on smoking prevalence (Centers for Disease Control and Prevention, 1996a). They found a 13% decline in smoking prevalence, from 20.1% (±0.9%) between 1990 and 1992 to 17.4% (±0.9%) between 1993 and 1995. After subtracting the percent change for the entire US, this 13% figure is reduced to 10%.

Statewide studies of the effects on PCC have also shown declines in smoking behaviors associated with media campaigns. In California, Pierce <i>et al.</i> indicated a net decline of 16% over the 1989–1993 period (<i>P < 0.001</i>) and a net decline of 9% over the 1994–1996 period (<i>P < 0.001</i>) (Pierce <i>et al.</i>, 1998b). Interestingly, Pierce <i>et al.</i> found that PCC decreased by only a slightly greater rate than smoking prevalence in California for the 1989–1993 period, but found larger decreases in PCC than smoking prevalence for the 1994–1996 period (Pierce <i>et al.</i>, 1998b). This relatively small difference is consistent with results from COMMIT that found that smoking campaigns mostly affected
light and not heavy smokers in the early years (COMMIT Research Group, 1995). Over time, however, heavier smokers may be influenced to reduce their smoking behaviors. Over a longer time period, Abt Associates found a 5% net decline in PCC for California between 1992 and 1997 (Abt Associates, 1998).

The study by Hu et al. was unique because they attempted to control for the effects of other concurrent policies in California (Hu et al., 1995a,b). They found that, after controlling for tax changes and other factors influencing smoking rates, PCC fell by 7.7 packs per capita, which translated to about 7–8%, over the period 1988–1994. They reported that slightly over 20% of the decrease in cigarette consumption during that period was associated with the media campaign \( (P < 0.02) \), while almost 80% was associated with tax changes \( (P < 0.01) \). Glantz and Goldman (Glantz and Goldman, 1998), however, argued that Hu et al. (Hu et al., 1995a,b) underestimated the effect on PCC because of their failure to take increases in industry advertising into account.

While not specifically directed at youth, studies of California’s general population campaign indicated high levels of youth media awareness (Independent Evaluation Consortium, 1998; Pierce et al., 1998a). Pierce et al. reported, however, no significant differences in susceptibility to smoking between exposed and unexposed students (31.1 versus 29.3%), as measured by the 1996 California Tobacco Survey (Pierce et al., 1998a). The same investigation also showed no significant differences in seriously thinking about quitting among all exposed and unexposed youth smokers (40.2 versus 34.4%) and among those who smoked more cigarettes compared to those who smoked fewer cigarettes (85.1 versus 76.2%). Popham et al. found mixed results for the effects of the California campaign on youth use (Popham et al., 1994). Both smoking prevalence and initiation showed significant drops \( (P < 0.003 \text{ for both}) \) between 1990 and 1991, but intention to quit did not significantly increase. Moreover, there was no significant difference in smoking prevalence rates or intention to quit among students exposed to the campaign and those not exposed, and exposed students were more likely than unexposed students to consider initiating smoking. The authors suggested that the effects of concurrent tobacco advertising and promotion may have contributed to the lack of significant results for exposed versus unexposed students.

While research has not shown that the California campaign helped reduce youth smoking rates within the state, youth use began increasing in the nation as a whole at the same time. About 24% of US high school students reported having smoked one or more of the past 30 days in 1990 (Centers for Disease Control and Prevention, 1992), rising to 25.4% in 1992 (Centers for Disease Control and Prevention, 1994a) and to 30.5% in 1993 (Centers for Disease Control and Prevention, 1995). These findings suggest that the campaign may, in fact, have helped counter the rate of increase among California minors (Independent Evaluation Consortium, 1998). More recent results indicated a significant drop in 30-day prevalence of 22% in California, compared to 9% in the rest of the nation. Significant increases in quit attempts and calls to the quit smoking hotline were also reported (Independent Evaluation Consortium, 2001).

Massachusetts

Massachusetts implemented its state program in 1992. In early 1993, a $0.25 tax hike was implemented, with another $0.25 increase in 1996. Shortly following the first increase, the state-based programs of the Massachusetts Tobacco Control Program (MTCP) were initiated, with the media campaign following soon thereafter in late 1993. Statewide interventions included statewide education campaigns, a quit line and technical assistance project. Local programs, which included cessation interventions, school- and community-based education programs, coalitions, primary care prevention centers, and school-based health centers, began in early 1994 (Centers for Disease Control and Prevention, 1996a; Abt Associates, 1998; Wakefield and Chaloupka, 2000).

Although the average budget for the first 3 fiscal years of the MTCP was approximately $40 million,
there was a decline in revenues during this period, from $43 million in 1995 to less than $37 million in 1997. The budget for the media campaign specifically decreased from about $13 million in 1995 to $11.70 million in 1997 (Abt Associates, 1998) averaging about $2.00 per capita. The campaign’s theme focused on the health risks of smoking, cessation and ETS.

According to the Centers for Disease Control and Prevention, Massachusetts experienced a 9% decline in smoking prevalence, from 23.5% (±1.4%) during the 3 years before the campaign (1990–1992), to 21.3% (±1.2%) during the 3 years after its implementation (1993–1996) (Centers for Disease Control and Prevention, 1996a). By contrast, smoking prevalence declined by only 3% in the rest of the nation, from 24.1% (±0.3%) to 23.4% (±0.2%). Subtracting these figures yields a net decline of 6% in Massachusetts. Abt Associates also reported a 9% decrease (22.6% in 1993 to 20.6% in 1997) in smoking prevalence in Massachusetts over approximately the same time period (1992–1997) (Abt Associates, 1998).

Data from the Centers for Disease Control and Prevention indicated that Massachusetts’ PCC decreased by 20% between 1992 and 1996, compared to a 6% reduction in the rest of the nation, representing a net decline in Massachusetts of 14% (Centers for Disease Control and Prevention, 1996a). Between 1992 and 1997, Abt Associates found a similar decrease in Massachusetts’ PCC as the Centers for Disease Control and Prevention estimates (Abt Associates, 1998). According to Abt Associates, PCC dropped by 31% in Massachusetts between 1992 and 1997, compared to a 14% decrease in the rest of the country, representing a 17% net decline in Massachusetts (Abt Associates, 1998).

Although larger reductions in smoking prevalence were found in the early years of both the California and Massachusetts programs, the reverse seemed to be true for PCC in Massachusetts. In addition, Abt Associates reported that both heavy and everyday smokers showed steeper declines in smoking rates than light smokers, and everyday smokers showed sharper decreases than occasional smokers (Abt Associates, 1998).

Abt Associates found that youth use in Massachusetts increased between 1993 and 1996, but the rate of increase was less than that reported for other states and use actually dropped among eighth graders (Abt Associates, 1998). Smoking prevalence among Massachusetts’ eighth graders declined by 2% between 1993 and 1996, compared to a 26% increase in the rest of the nation, representing a 28% net decline. Among 10th graders, Massachusetts saw an increase in smoking prevalence rate of 16%, compared to a rate of 23% in the rest of the US, for a net increase of 7%. Smoking prevalence increased 7% among Massachusetts’ 12th graders, compared to a national increase of 14%, representing a net increase of 7% in Massachusetts. Siegel and Biener followed youth over a 4-year period (Siegel and Biener, 2000). They reported that Massachusetts’ youth aged 12–13 (at baseline) who recalled television campaign ads were less likely to progress to established smoking than those who did not recall ads, but significant effects were only found for younger, and not older, adolescents.

**Michigan**

Compared to California and Massachusetts, Michigan conducted a small campaign in 1991. Unlike California and Massachusetts, no tax increases were implemented in Michigan in the years immediately preceding or following the implementation of the program. Michigan’s per capita expenditures were also far less than those of California and Massachusetts. Michigan spent approximately $0.45 million per year or $0.05 per capita (Pechmann, 1997). Moore and Associates observed a 4.4% drop in Michigan’s smoking prevalence, which was not defined in their report, between 1990 and 1991 (before the tax hike) (Michigan Department of Public Health, 1992), whereas the US rates stabilized during the same time period (Centers for Disease Control and Prevention, 1994b), so the net decline in Michigan was 4.4%.
Oregon

Oregon implemented a $0.30 per pack tax increase in 1997, 10% of which was earmarked towards a new Oregon Tobacco Education and Prevention Program (OTEPP). The OTEPP included community- and school-based programs, a statewide quit line, multicultural outreach and education, and a statewide media campaign. The $4 million campaign highlighted the dangers of smoking and secondhand smoke, and attempted to counter tobacco industry advertising. Approximately 30%, or approximately $2 million per year and $0.60 per capita (US Census Bureau, 1999a), of the tax revenues were spent on the campaign and public relations. Broadcasters also provided about 50% additional free supplemental airtime (Goldman and Glantz, 1999a; Oregon Health Division, 1999).

Based on the Centers for Disease Control and Prevention data (Centers for Disease Control and Prevention, 1999a), PCC increased by 2.2% in Oregon between 1993 and 1996, compared to a decline of 0.6% in the rest of the nation. Between 1996 and 1998, after the campaign began, Oregon’s PCC fell by 11%, compared to a 1% decrease in the rest of the country, which represented a 10% net decline in PCC between the two time periods. After accounting for the effect of the tax, a 5% net decline was estimated (Centers for Disease Control and Prevention, 1999a).

Community-level campaigns

Some studies of community-level interventions have found reduced smoking rates associated with mass-media campaigns among the general population. Wewers et al., for example, obtained some evidence that a local campaign in Columbus, OH led to higher quit rates (Wewers et al., 1991). Participants who were voluntarily recruited through the American Lung Association, and were therefore probably more motivated to stop smoking than the average smoker, showed greater cessation rates three months post-campaign than participants recruited through random phone selection. The study, however, did not attempt to determine the differential effects of method of subject recruitment, use or non-use of nicotine gum and the media campaign, so it was difficult to determine the size of the campaign’s influence alone.

Summary of mass-media campaigns targeted at the general population

The results from California and Massachusetts suggest that a well-funded and implemented mass-media campaign, in conjunction with a well-coordinated tobacco control program, were associated with notable decreases in smoking rates. Reductions in net smoking prevalence, of approximately 6–12%, were realized. Even larger reductions in net PCC 3–4 years after the campaign’s initiation have been reported, even with decreases in program funding over its duration. Although both states saw a drop in funding over time, the proportional decline was greater in California than Massachusetts. Without political interference, California’s results may have been more dramatic, given the longer duration of its program and strong support of the population.

Differences in changes in smoking rates may be partially explained by the scale of the campaigns and associated expenditures on tobacco control activities. California’s per capita expenditures of $0.50 were far lower than the $2.00 in Massachusetts. Data provided by M. Gutierrez of the Centers for Disease Control and Prevention on the cost of campaigns implemented in Oregon (about $0.60 per capita) and Michigan (about $0.20 per capita) indicated smaller effects in less-populated markets. In addition to lower per capita expenditures, there may have been higher costs of reaching smokers in the less-populated areas. Some of the difference may have also been due to the longer duration observed for the California and Massachusetts campaigns.

The effects of media campaigns seemed to vary over time. The California campaign appeared to indicate greater incremental declines in smoking rates in the years immediately following the start of the campaign, suggesting that there is a limit to the effectiveness of campaign duration. Since at least some of the reduction may be due to funding cuts, this issue needs empirical study. Massachusetts also experienced continuous growth...
in smoking rates in the first 3 years (Centers for Disease Control and Prevention, 1996a) that appeared to have tapered off in the following years (Abt Associates, 1998). It appears that campaign impact may build quickly over the first 3 years and then additional reductions taper off in ensuing years.

Another important difference in the effects of state programs may be other policies simultaneously implemented. The larger effects of the campaign in California, despite its relatively low per capita expenditures, may have been due to the tax hike, as indicated by Hu et al. (Hu et al., 1995). While Massachusetts also raised taxes, it appeared that the media policy effects may have been counteracted by a reduction in price to compensate for the higher taxes (Centers for Disease Control and Prevention, 1996a).

Studies of the California and Massachusetts campaigns yielded mixed results regarding youth effects. Similar conclusions were drawn by Lantz et al. (Lantz et al., 2000). Examining patterns across states, Chaloupka and Grossman found that tax revenues earmarked for education and mass-media campaigns were associated with reduced youth cigarette consumption, even after controlling for the effects of other tobacco control policies (Chaloupka and Grossman, 1996).

Empirical literature review of mass-media campaigns directed at youth

State-level campaigns

Arizona

In 1994, Arizona voters passed Proposition 200, which increased tobacco taxes by $0.40 per pack. In its first year, the new tax generated over $120 million. About 23% of these revenues ($27 million per year) were earmarked towards tobacco control interventions, which included a mass-media program that was launched in 1995. In 1994, Arizona also received a 3-year $1 million grant from the Robert Wood Johnson Foundation as part of SmokeLess States Program and $3.17 million to combat youth use in Tucson (Bialous and Glantz 1999; Wakefield and Chaloupka, 2000).

The program was hampered by interference from the tobacco industry. Although no funds were redirected towards non-tobacco activities, industry lobbying resulted in a $10 million cap placed on tobacco control-related spending the first year of the program and $15 million the second year. The media campaign was never successfully tied to local activities. Further, monies were diverted from the campaign to fund local projects, so that part of the $5.5 million allocated to the campaign in 1996 ($1.24 per capita) was directed to other projects in 1997. In addition, the program was not allowed to include attacks on the tobacco industry (Bialous and Glantz, 1997). With all these restrictions, Arizona failed to develop a comprehensive tobacco control program (Bialous and Glantz, 1997).

After the program was implemented, Bialous and Glantz reported an 8% decline in PCC in Arizona between 1994 and 1995 (Bialous and Glantz, 1997). However, the lack of baseline rates corresponding to the beginning of the program makes it difficult to determine the meaning of this 8% figure and the program’s specific impact (Wakefield and Chaloupka, 2000).

Florida

Unlike some other state programs, the Florida Tobacco Pilot Program (FTPP) did not begin with a tax hike. The FTPP included a media campaign, school-based initiatives, an education and training initiative, enhanced youth access enforcement, and laws penalizing youth for possession. It also fostered community partnerships (Wakefield and Chaloupka, 2000).

Florida implemented its $25 million ‘Truth’ media campaign in 1998. The campaign initially attacked the tobacco industry directly but was later restrained from using an industry manipulation theme (Zucker et al., 2000). Based on 1999 Florida figures for the entire population, rather than just the youth targeted by the campaign, per capita costs were $1.65 (US Census Bureau, 1999a).

The Centers for Disease Control and Prevention
examined the change in 30-day smoking prevalence in Florida the following year (Centers for Disease Control and Prevention, 1999b). Smoking rates among middle schoolers dropped from 18.5 to 15%, a 19% reduction ($P < 0.01$), and among high school from 27.4 to 25.2%, an 8% decrease ($P = 0.02$). Overall, the smoking rate declined by 10%. Based on the 1999 Monitoring the Future survey, we calculated a weighted average of the percentage reduction in the national smoking prevalence of 30-day smoking of eighth, 10th and 12th graders between 1998–1999, which yielded a 5% reduction (Institute for Social Research, University of Michigan, 1999). Thus, the net decline in Florida was 5%.

Bauer et al. found that reductions in the smoking rate were larger in the second year than the first year (Bauer et al., 2000), with use among middle schoolers dropping to 11.1% (a 40% drop over 2 years) and among high schoolers to 22.6% (a 16% reduction over 2 years). It is unclear, however, the extent to which these results are attributable to the impact of other factors, such as a large cigarette price increase during that year and prior youth access policies. Since research has shown that cost has a large effect on youth smoking (Lantz et al., 2000), a large part of the reduction in 1999 may be due to the price increase.

**Community-level campaigns**

Flay et al. found that communities with both media- and school-based programs experienced a 3.8% increase in smoking prevalence between the pre- and 1-year post-test, and 13% increase between the pre- and 2-year post-test periods (Flay et al., 1995). By contrast, those with only a school program experienced a 10 and 18% increase, respectively, over the same time periods. These results suggest that adding a media campaign to a school-based program lead to lower increases in smoking rates, with a 6.2% net increase after 1 year and 5% after 2 years. Flynn et al. found that those students exposed to a media campaign in addition to a school-based program were at lower risk for smoking initiation than those receiving only a school-based program (Flynn et al., 1995). There was no significant difference in outcomes, however, between a media-only intervention and no treatment (Flay et al., 1995). This result suggests that media interventions alone may have been insufficient to combat youth smoking and that a broad array of concurrent programs may be needed to impact youth use.

Some investigations of community-level media interventions have also found no significant impact on youth smoking rates. Worden et al. looked at the association between an 18-month television media campaign directed at 10–12 year olds and smoking initiation (Worden et al., 1983). There were no significant differences in youth smoking rates between communities that were in range of the signal and those out of the signal range. Murray et al. examined the effects of a youth-oriented mass-media campaign and school education program implemented in Minnesota between 1986–1990 compared to a control state (Wisconsin) (Murray et al., 1994). Although Minnesota reported a net decline in smoking prevalence of 2.4%, the reduction was not significant. Minnesota did, however, observe a lower average smoking prevalence rate during this period (12.6 versus 16.1%, $P < 0.0001$). Bauman et al. explored the effects of three mass-media campaigns conducted in the greater Stanford, CA area on smoking attitudes and behaviors (Bauman et al., 1991). The paid campaigns aired throughout November 1985, January 1986 and April 1986. Overall, although smoking prevalence increased from baseline to 2- to 8-month follow-up, there were no significant differences between groups. Lewitt et al. examined 1990 and 1992 COMMIT data, a cross-sectional, nationally representative, school-based survey of 13- to 16-year-olds (total $n = 15432$) (Lewitt et al., 1997). Paradoxically, they found that increased exposure to anti-tobacco messages was associated with increased smoking rates. Seghers and Foland also found no increase in quit attempts following media campaigns in Denver, CO and Spokane, WA (Seghers and Foland, 1998). Both campaigns, however, ran for only a 2-week period.
Reductions in smoking prevalence associated with mass-media campaigns

Summary of studies of youth-oriented campaigns

Florida and Arizona youth-oriented programs appeared to be associated with reduced youth smoking rates. These campaigns seemed to be more successful than most of the smaller, community-level interventions. The community-level study that showed significant results (Flay et al., 1995) was associated with a media campaign of longer duration and greater intensity than other programs. In addition, the implementation of other concurrent tobacco control policies seemed to be important in terms of how a media campaign influenced youth smoking. Media campaigns have been successfully linked with school education and community involvement programs in Florida (Zucker et al., 2000). Flay et al. specifically found that those communities with media and school education programs were associated with lower youth smoking rates than communities with a single intervention (Flay et al., 1995).

Conclusions and suggestions for future research

This literature review suggests that well-funded and implemented mass-media campaigns targeted at the general population and implemented at the state level, in conjunction with a comprehensive tobacco control program, are associated with reduced smoking rates. Youth-oriented interventions have shown more mixed results, particularly smaller, community-level media programs, but indicate strong potential.

A number of differences in the campaigns limit the extent to which results are comparable across studies. This review and that of Flay (Flay, 1987) found that campaigns of longer duration and higher intensity appeared to be associated with greater declines in smoking rates. We also have found larger effects in the first 3 years of the campaign, but further research is needed on these effects. Randomized experimental designs with appropriate control groups should be conducted to supplement naturalistic investigations to better gauge campaign influence.

From our review of the literature, the role of an ad’s content, meaning the message or theme portrayed in the ad, is unclear. Two of the few population-based studies conducted by Biener (Biener, 2000) and Biener et al. (Biener et al., 2000) reported that ads evoking strong emotions were most effective, whereas humorous ads were least effective in terms of recall by youth and adult smokers and non-smokers, as well as promoting cessation efforts. Pechmann and Reibling reported that youth campaigns that used single messages already found to be effective, avoided unclear messages and utilized youth spokespersons were more cost-effective (Pechmann and Reibling, 2000). Additional research is needed on the relationship of different types of content to changes in smoking behavior. The impact of a particular type of message, however, is likely to depend several key variables, including the demographic characteristics of the population targeted (Lantz et al., 2000), as well as the extent of support for tobacco control activities in the jurisdiction in which the campaign is being implemented.

In examining the impact of content on different demographic groups, the definition of smokers may be important. Current definitions of smoking prevalence for youth, such as smoking in the last 30 days, may not adequately capture their more established smoking patterns. Studies such as that of Siegel and Biener, which examined progression to established smoking, may be an important, often overlooked outcome measure for media programs (Siegel and Biener, 2000).

Other tobacco control policies may be a source of differences in the effect of media campaign. As indicated by Hu et al., for example, some of the association between the California program and reduced smoking prevalence appeared to have been due to the higher cigarette prices induced by a tax increase (Hu et al., 1995a,b). Massachusetts also increased taxes at the start of the media campaign, but tobacco manufacturers reduced cigarette prices shortly thereafter to their pre-tax levels (Centers for Disease Control and Prevention, 1996a). In addition, many cities in California and Massachusetts passed clean air laws (Wakefield...
and Chaloupka, 2000) during the media campaigns. Additional research is warranted that examines the influence of these concurrent policies.

Besides having their own independent effect on smoking rates, attention to other policies may affect the influence of the media campaign. Additional information relevant to smoking behavior, such as news coverage of tobacco-related policies, may both increase the effectiveness of messages from the media campaign and reduce the level of information needed to overcome advertising by tobacco manufacturers. The role of other sources of anti-tobacco information besides the campaign merits further study to determine if these other messages enhance a campaign’s impact.

The influence of media campaigns may also depend on other interventions already in place before the campaign began. Other already existing policies, such as clean indoor air laws, may have already helped increase cessation attempts by smokers. Those still smoking may be less likely to change their behavior in response to a media campaign. Media campaigns may, however, reinforce the effect of existing laws by creating stronger norms against smoking. Future studies should consider policies already in effect and those being newly implemented.

In conducting future research, it will be important to consider the scale and duration of programs, how the impact of campaigns may change over time, the role of different themes and their influence on specific subgroups, and, perhaps most important, the impact of other policies in effect or being initiated (Levy and Friend, 2000). Media attention directed to tobacco policies may be just as important as advertisements aired as part of the campaign. Regardless, media campaigns appear to have strong potential, in conjunction with other tobacco control interventions, to help reduce the morbidity and mortality associated with cigarette use (Levy and Friend, 2001).

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