Preventing and Reducing Tobacco Use among Youth and Young Adults: A Systematic Review of the Effectiveness of Mass Media Interventions, 2008-2013

Emily Brennan
Michelle Jeong  
*University of Pennsylvania*
Ani Momjian-Kybert
Robert Hornik  
*University of Pennsylvania*

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Emily Brennan, Michelle Jeong, Ani Kybert-Momjian, Robert C. Hornik

Annenberg School for Communication
University of Pennsylvania
Philadelphia, Pennsylvania

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Corresponding Author:
Professor Robert C. Hornik
Annenberg School for Communication
University of Pennsylvania
3620 Walnut St
Philadelphia, PA 19104
rhornik@asc.upenn.edu

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INTRODUCTION

Globally, more than 80,000 young people begin using tobacco every day.[1] Almost all tobacco use initiation occurs before age 26, and it is estimated that one of every three young smokers will die from a tobacco-related illness.[2] As such, preventing the initiation and continued use of tobacco among youth and young adults is essential for reducing tobacco-related illness and death. Mass media interventions have been widely used in past efforts to reduce tobacco use,[2, 3] and are poised to continue playing a central role in comprehensive tobacco control programs worldwide.[4, 5]

Several recent reviews have concluded that mass media interventions can effectively reduce tobacco use among youth and young adults.[2, 3, 6, 7] In particular, the 2012 Surgeon General’s report on Preventing Tobacco Use Among Youth and Young Adults[2] provided a comprehensive assessment of the effects of campaigns on young people’s smoking behaviors. Considering the findings from more than 60 cross-sectional, longitudinal, and controlled field trials published between 1981 and June 2008, the reviewers found sufficient evidence to conclude that increasing youth exposure to antitobacco campaigns could change attitudes, beliefs, intentions, and behaviors in the desired direction.[2] Importantly, this body of studies also provided some insight into the determinants of campaign success by demonstrating: a) dose-response relationships between exposure and reduced smoking behavior; b) the particular effectiveness of messages that evoke negative emotions by focusing on the health effects of smoking and secondhand smoke or the deceptive practices of the tobacco industry; c) positive effects of messages designed for adults on youth smoking prevalence; and d) little evidence of systematic differences in effectiveness by audience sub-groups.[2] Consistent conclusions were reached in a
recent Cochrane Review, although this review’s more stringent inclusion criteria (controlled trials or time series studies) meant that the findings from only seven studies were considered.[6]

**Objective**

We built on these previous reviews by assessing the extent to which recent research has continued to show that mass media interventions can effectively reduce smoking among youth (12-17) and young adults (18-25 year olds). Picking up where the Surgeon General’s report (the most comprehensive of the recent reviews) left off,[2] we used empirical studies published between July 2008 and August 2013 to address one primary and four secondary research questions.

RQ1: Can antitobacco mass media interventions reduce smoking intentions and behaviors among youth and young adults?

RQ2: Is the effectiveness of antitobacco mass media interventions among youth and young adults affected by: the duration and intensity of message exposure (RQ2a); interactions between exposure and audience demographic and personality characteristics (RQ2b); chosen message themes, strategies and executional characteristics (RQ2c); and interactions between message characteristics and audience characteristics (RQ2d)?

**METHOD**

**Data sources**

Our search strategy replicated the approach used in three similar recent reviews.[2, 3, 8] We searched five databases: PubMed, PsycInfo, Web of Science, Scopus and Embase. Our search string for the PubMed database was: ((tv OR television OR radio OR broadcast* OR mass media
OR advertis* OR marketing OR countermarketing) AND (prevent* OR cessation OR initiat*)
AND (tobacco OR smoking)); a version of this string was used for all other databases. We
excluded non-English articles, as well as letters and editorials. Our initial search covered articles
published (in print or online ahead of print) between July 1 2008 and April 30 2013. Search
alerts in each database identified articles published between May 1 and August 31 2013.

Study selection
The initial search yielded 3123 records. Following the PRISMA 2009 Flow Diagram,[9] we
screened all records and identified 1219 duplicates, leaving 1904 unique records. An additional
231 unique records were identified by search alerts. All unique records were then screened for
potential relevance based on the title and abstract. Of the 2135 unique records, 392 appeared to
assess the impact of antitobacco mass media interventions and were categorized as potentially
relevant. Thirty-two records were then excluded because they were published prior to July 2008
(n=27; not all databases allowed us to specify the month of publication), were reviewed in the
Surgeon General’s Report[2] even though they were published after July 2008 (n=3), or provided
insufficient information in their results sections (n=2), leaving 360 potentially relevant articles.

Two authors assessed the full text of each potentially relevant article for eligibility. We
developed two sets of inclusion criteria, as appropriate for our research questions. Part A of Box
1 presents the inclusion criteria for studies used to assess the overall effectiveness of antitobacco
mass media interventions among youth and young adults (RQ1). From the 360 potentially
relevant articles, 21 met these criteria. We also used these 21 studies to summarize evidence
regarding the impact of exposure duration and intensity (RQ2a), and the impact of audience
characteristics on campaign effectiveness (RQ2b). Part B of Box 1 details the inclusion criteria for studies used to assess the impact of different message themes, strategies, and executional characteristics (RQ2c). We also used these studies to summarize evidence of interaction effects between message characteristics and audience characteristics (RQ2d). Of the 360 potentially relevant articles, 22 met these criteria (only one of which overlapped with the 21 studies used for RQ1, RQ2a and RQ2b).

**Box 1 Inclusion Criteria**

**Part A: Inclusion Criteria for Studies Assessing the Effectiveness of Anti-Tobacco Mass Media Interventions (RQ1, RQ2a, RQ2b)**

- Study must be published after July 1 2008
- Study must present original data that has not been previously reported
- Study must measure the effectiveness of an antitobacco mass media intervention among 12–25 year olds
  - Campaign may be adult-targeted as long as the effectiveness of the campaign was evaluated among 12–25 year olds
  - Study may include respondents older than 25 so long as results are presented separately for younger and older age groups or the majority of the sample is younger than 25
- Study must present quantitative data relating exposure to mass media messages to a measured outcome that is indicative of campaign impact
  - Exposure can be measured using objective measures (e.g., naturally-occurring variation in GRPs over time or between geographical areas), self-reported measures (e.g., recall), or through a comparison between exposed and unexposed groups (e.g., in controlled field studies and forced exposure studies)
  - Include pre/post studies that do not measure exposure but provide enough other information to give us confidence that the observed effects are due to the campaign and not to some other external historical influence
Excluding simulation studies

- Study must include at least one measure of smoking-related intentions or behaviors as an outcome (this includes smoking urges/desires), unless the campaign targeted a specific smoking-related belief and measured this belief as the primary outcome
- Study must measure the effectiveness of an intervention that employed mass media channels such as television, radio, print and/or outdoor advertising where exposure is passive or involuntary, and not the result of active seeking
  - Exclude studies that evaluate the effectiveness of an intervention that largely required respondents to “opt-in” to be exposed to informational materials (e.g., tailored online interventions, participatory radio campaigns)
- Study must report the overall effects of exposure to a campaign, or to specific campaign messages (i.e., compared to those who were not exposed)
- Effects of exposure must be evaluated in a real-world setting, and the interventions being studied must resemble interventions that could realistically be implemented in the world
  - Exclude laboratory experiments and forced exposure studies where exposure occurs as part of an educational intervention due to unnatural exposure conditions
  - Include controlled field trials where exposure conditions represent conditions of natural exposure

**Part B: Inclusion Criteria for Studies Assessing the Effectiveness of Different Message Themes, Strategies and Executional Characteristics (RQ2c, RQ2d)**

- Study must be published after July 1 2008
- Study must present original data that has not been previously reported
- Study must compare the effectiveness of different antitobacco messages or different message characteristics among 12–25 year olds
  - Messages may be adult-targeted so long as they are evaluated among 12–25 year olds
  - Study may include respondents older than 25 so long as results are presented separately for younger and older age groups or the majority of the sample is younger than 25
- Study must present quantitative data relating exposure to different mass media messages to
a measured outcome that is indicative of campaign impact

- Exposure can be measured using objective measures, self-reported measures, or through a comparison between groups exposed to different messages
- Exclude simulation studies

- Message effectiveness can be measured using recall, perceived effectiveness, cognitive and affective responses, beliefs, attitudes, intentions, behaviors, or other measures deemed to be indicative of campaign impact
- Study must measure the effectiveness of an intervention that employed mass media channels such as television, radio, print and/or outdoor advertising where exposure is not the result of active seeking
  - Exclude studies that evaluate the effectiveness of an intervention that largely required respondents to “opt-in”
- The interventions being studied must resemble interventions that could realistically be implemented in the real world

Data extraction

Data from all eligible studies was extracted by one author, and then reviewed by a second, with the first three authors each reading two-thirds of all eligible studies.

For studies relevant to RQ1, RQ2a and RQ2b, our focus was on analyses examining associations between campaign exposure and campaign effectiveness, with effectiveness defined as changes in smoking-related intentions or behaviors. For each study, we extracted: campaign details; study design, analytic sample, and location; exposure measures used for 1) analysis, and 2) descriptive purposes only; outcome measures and control variables; effects; and sub-group differences. All data is documented in Appendix A; a summary of each study and its findings are presented in Table 1. For studies relevant to RQ2c and RQ2d, our focus was on analyses comparing the effectiveness of different message themes and strategies and/or different executional
characteristics, with effectiveness measured using a broader set of outcome measures including recall, beliefs, attitudes, and other proximal indicators of message impact. We extracted: message details (themes/strategies compared; executional characteristics compared; medium); study design, message exposure, sample, and location; outcome measures; effects of different message themes/strategies; effects of different executional characteristics; and sub-group differences. All data is documented in Appendix B, with a summary presented in Table 2.

RESULTS

Effectiveness of mass media interventions among youth and young adults

In the 2012 Surgeon General’s report[2] the authors considered the findings from 17 previous reviews that in combination reviewed more than 60 cross-sectional, longitudinal, and controlled field trials, as well as the findings from seven newer studies not previously reviewed. The authors concluded there was “convincing evidence that antismoking media campaigns can be effective in reducing youth smoking [p. 685]”, and that evidence was consistent across studies with different methodological approaches. Building on this, we identified 21 additional studies—published between July 2008 and August 2013—that assessed the effectiveness of antitobacco mass media interventions among youth and young adults (RQ1). Of these 21 studies, 14 reported positive effects of campaign exposure,[10-23] and seven reported no effects[24-30] (Table 1).

As described elsewhere,[2, 3, 8, 31] our confidence in the inferences drawn from a given study is determined by various aspects of the study’s research design. Therefore, we considered the extent to which evidence of positive (and no) campaign effects was provided by studies using each of three broad methodological approaches: controlled field trials, and longitudinal, and
cross-sectional designs.

**Controlled field trials**

One of the 21 studies employed a controlled field trial design to test the effectiveness of a four-year multi-themed campaign with high school students in four states in the United States (US). However, the intervention did not reduce smoking prevalence or intentions. These null results are likely attributable to a strong tobacco control environment, the concurrent airing of the national *truth®* campaign, and national declines in prevalence over the study period, such that there was effectively little more that the campaign could achieve.[24]

One additional study used a quasi-experimental design to examine the effects of screening a single antitobacco advertisement before a movie.[25] In a cinema in Germany, the advertisement was shown before movies in weeks one and three of the study, but not in weeks two and four. Although this study observed a trend towards differences between individuals in the intervention and control conditions, there was no effect of condition on smoking intentions among 10-17 year olds.[25]

**Longitudinal studies**

Ten of the 21 studies employed some type of longitudinal design; eight found positive effects,[10-17] while two found no evidence of campaign effects.[26, 27]

Particularly strong evidence for campaign effects was provided by three studies,[10-12] each of which took advantage of the natural experiment created when there is variability in campaign
activity between different media markets and over long periods of time. In these studies, changes in smoking measured through cohort studies or repeated cross-sectional surveys were related to objective measures of campaign activity: gross rating points (GRPs) or targeted rating points (TRPs). Such measures are used by the advertising industry to estimate the number of people potentially exposed to an advertisement, and they capture the reach and frequency of exposure. For example, 1000 GRPs could indicate that 100% of those in the population were exposed 10 times, or that 50% were exposed 20 times.[8] Evaluating the national truth® campaign in the US, Farrelly and colleagues showed that the risk of smoking initiation among 12-17 year olds decreased by 20% for every 10,000 truth® GRPs that respondents were potentially exposed to over a period of up to five years.[10] An Australian study conducted over a 16-year period found that smoking prevalence among high school students was inversely associated with cumulative antitobacco TRPs in the three months and 12 months prior to each survey.[11] In a similar study with young adults in the US, greater exposure to antitobacco advertisements over 24 months was associated with higher rates of quitting.[12]

Individual-level exposure effects on smoking susceptibility and initiation were observed in two cohort studies.[13, 14] Youth who had often seen the national truth® campaign were less likely to initiate smoking than those who reported seeing the campaign only rarely, whereas exposure to the tobacco industry-sponsored Think. Don’t Smoke campaign was not associated with initiation, but did increase intentions to try cigarettes.[13] Another study found evidence of an indirect effect of exposure on smoking susceptibility, mediated through young people’s perceptions about the influence of antitobacco messages on their friends.[14]
Changes over time in population levels of smoking prevalence, consumption, and intentions were examined in three studies, all of which observed positive changes from pre- to post-campaign surveys.[15-17] Smoking prevalence in Florida declined when the Florida truth® campaign was on air, but started to increase again once the campaign ended (among those aged 16+).[15] Similarly, over the 10 years that the Smarter than Smoking campaign aired in Western Australia, smoking prevalence reduced from 28% to 7% among 14 year olds, and from 43% to 14% among 15 year olds.[16] Also in Australia, consumption, intentions, and smoking susceptibility all changed in a favorable direction from before to after the introduction of graphic health warnings on cigarette packs and the airing of two television advertisements supporting their introduction.[17] However, in each of these three studies, the absence of an analysis linking individual-level exposure with outcomes makes it difficult to attribute these effects solely to the campaign, particularly because all three campaigns were implemented in conjunction with other tobacco control interventions.[15-17]

Of the two longitudinal studies that did not find evidence of campaign effects,[26, 27] one evaluated a campaign targeting 25-49 year old smokers, and so unsurprisingly, did not observe increased quit attempts among 18-24 year olds,[26] while the other had limited power to detect campaign effects due to a very small sample size and short follow-up period.[27]

Cross-sectional studies

Nine of the 21 studies examined cross-sectional associations between campaign exposure and outcomes. Six observed positive effects,[18-23] while three found no effects.[28-30]
Positive effects of the *truth®* campaign were found in two studies: intentions not to smoke among 12-17 year olds were positively associated with confirmed awareness of the ads[18, 19] and with objective measures of campaign exposure.[19] One study reported positive associations between awareness of North Carolina’s *Tobacco. Reality. Unfiltered.* campaign and lower smoking prevalence among high (but not low) sensation seekers.[20] In addition, two studies reported that individuals who recalled seeing any antitobacco advertising over the past 30 days tended to have lower intentions to smoke[21] and a lower likelihood of being a current or former smoker (versus never smoker).[22] and one additional cross-sectional study also found positive associations between exposure and intentions, conditional on factors such as age, parental monitoring, and participation in school anti-smoking programs.[23]

Three cross-sectional studies found no effects of campaign exposure.[28-30] Contrasting with the positive effects of the *truth®* campaign described above, *truth®* recall among 18-24 year olds was not significantly associated with intentions not to smoke (possibly attributable to a ceiling effect, with 92% of non-smokers holding the desired intention) or with intentions to quit (although this effect was positive and approaching significance).[28] Smoking rates among youth in Indiana was unrelated to self-reported exposure to anti-smoking advertising,[30] and there was no effect of recalling antitobacco advertising on smoking susceptibility among adolescents in Malaysia and Thailand.[29]
<table>
<thead>
<tr>
<th>Authors &amp; Campaign</th>
<th>Target Audience</th>
<th>Campaign Goal/s</th>
<th>Study Design</th>
<th>Sample Age, Size and Location (Country)</th>
<th>Effect of Exposure on Intentions?</th>
<th>Effect of Exposure on Behaviors?</th>
<th>Effects of Audience Characteristics?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowell et al., 2009[18]; national “truth”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Cross-sectional</td>
<td>12-17; N=5,3079 – 22,220; US</td>
<td>Positive</td>
<td>N/A</td>
<td>Yes (race/ethnicity)</td>
</tr>
<tr>
<td>Davis et al., 2009[13]; national “truth” &amp; Philip Morris’ “Think. Don’t Smoke”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Longitudinal (cohort) x 3 waves</td>
<td>6–12th grade; N=10,919 – 13,195; US</td>
<td>Positive</td>
<td>Positive</td>
<td>N/A</td>
</tr>
<tr>
<td>Dietz et al., 2010[15]; Florida “truth”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Longitudinal (cross-sectional) x 8 waves</td>
<td>12-17; N=1800 in each wave; US</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
</tr>
<tr>
<td>Farrelly et al., 2009[19]; national “truth” &amp; Phillip Morris’ “Think. Don’t Smoke”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Cross-sectional</td>
<td>12-17; N=35,074; US</td>
<td>Positive</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Farrelly et al., 2009[10]; national “truth”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Longitudinal (cohort) x 8 waves</td>
<td>12-17; N=8904; US</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
</tr>
<tr>
<td>Flynn et al., 2010[24]; created for study</td>
<td>Youth (3 different target age groups); Prevention &amp; cessation</td>
<td>Controlled field trial</td>
<td>7-12th grade; N=19,966 – 23,246; US</td>
<td>No effect</td>
<td>No effect</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Study (Year, Reference)</td>
<td>Audience</td>
<td>Research Design</td>
<td>Target Age</td>
<td>N</td>
<td>Effect</td>
<td>Sensitivity</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------</td>
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</tr>
<tr>
<td>Hanewinkel et al., 2010[25]; “Factual Romance”</td>
<td>General audience (i.e., they measured effects among both youth and adults)</td>
<td>Cessation</td>
<td>Quasi-experimental field experiment</td>
<td>10-17; N=1148; Germany</td>
<td>No effect</td>
<td>N/A</td>
<td>No (age)</td>
</tr>
<tr>
<td>Kandra et al., 2013[20]; “Tobacco. Reality. Unfiltered”</td>
<td>Youth (11-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Cross-sectional</td>
<td>11-17; N=604 – 1,154; US</td>
<td>Positive</td>
<td>N/A</td>
<td>No (sensation seeking)</td>
</tr>
<tr>
<td>Nasim et al., 2009[21]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Cross-sectional</td>
<td>Middle school and high school students; N=353 – 1,338; US</td>
<td>Positive</td>
<td>N/A</td>
<td>Yes (race/ethnicity)</td>
</tr>
<tr>
<td>Paek, 2008[23]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Cross-sectional</td>
<td>Middle school &amp; high school students; N=987 – 2,176; US</td>
<td>Positive</td>
<td>N/A</td>
<td>No (smoking status)</td>
</tr>
<tr>
<td>Paek et al, 2011[14]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Longitudinal (cohort) x 2 waves</td>
<td>6th and 8th grade; N=654; US</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
</tr>
<tr>
<td>Richardson et al., 2010[28]; national “truth”</td>
<td>Youth (12-17 year olds)</td>
<td>Prevention &amp; cessation</td>
<td>Cross-sectional</td>
<td>18-24; N=19,701; US</td>
<td>No effect</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Richardson et al., 2011[26];</td>
<td>Adult smokers (25-</td>
<td>Cessation</td>
<td>Longitudinal (cohort) x 2 waves</td>
<td>18-24; N=552; US</td>
<td>N/A</td>
<td>No effect</td>
<td>No (age)</td>
</tr>
</tbody>
</table>
### Table 1: Summary of Exposures and Effects of Antitobacco Campaigns

<table>
<thead>
<tr>
<th>Study Reference</th>
<th>Age Group</th>
<th>Campaign Type</th>
<th>Study Design</th>
<th>Duration</th>
<th>Sample Size</th>
<th>Outcome</th>
<th>Mixed Campaign Target Audience</th>
<th>Mixed Campaign Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schmidt et al., 2009[27]; “Changing Social Norms”</td>
<td>Youth (12-18 year olds)</td>
<td>Prevention</td>
<td>Longitudinal (cohort) x 2 waves</td>
<td>12-18; N=149; Canada</td>
<td>No effect</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Seo et al., 2009[30]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Cross-sectional</td>
<td>Middle school and high school students; N=1,416 – 3,433; US</td>
<td>No effect</td>
<td>No effect</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Shah et al., 2008[22]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Cross-sectional</td>
<td>13-15; N=58,876; India</td>
<td>Positive</td>
<td>No (sex)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terry-McElrath et al., 2013[12]; all antismoking TV ads</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Longitudinal (cohort) x at least 2 waves</td>
<td>20-30; N=26,315; US</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>White et al., 2008[17]; graphic health warnings campaign</td>
<td>Adult smokers</td>
<td>Cessation</td>
<td>Longitudinal (cross-sectional) x 2 waves</td>
<td>High school students; N=2,050 – 2,432; Australia</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>White et al., 2015[11]; all antismoking TV ads</td>
<td>Adult smokers (mostly)</td>
<td>Cessation</td>
<td>Longitudinal (cross-sectional) x 6 waves</td>
<td>High school students; N=82,479; Australia</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Wood et al, 2009[16]; “Smarter than Smoking”</td>
<td>Youth (10-15 year olds)</td>
<td>Prevention &amp; Cessation</td>
<td>Longitudinal (cross-sectional) x 10 waves</td>
<td>12-15; N=300 – 3000; Australia</td>
<td>N/A</td>
<td>Positive</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Zawahir et al., 2013[29]; any ads recalled</td>
<td>Mixed</td>
<td>Mixed</td>
<td>Cross-sectional</td>
<td>13-17; N=833 – 839; Malaysia &amp; Thailand</td>
<td>No effect</td>
<td>No (sex)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Full details for each study are provided in Appendix A. In this table, results are summarized as providing evidence consistent with there being: positive effects of exposure on intentions (i.e., stronger intentions not to smoke) and/or behaviors (i.e., less smoking behavior); negative effects of exposure; or no effects of exposure. “Mixed” campaign target audience and/or campaign goals indicate those studies that measured exposure to any or all antitobacco campaigns over a specified period of time. N/A = outcome not measured in study or effects of audience characteristics not examined (or not tested) statistically in study.
\(^a\) Study also included in Table 2 (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).

\(^b\) T-test for difference between sub-groups conducted by authors.

\(^c\) Study was published online ahead of print in 2013, during the time period covered by the review.
Optimal duration and intensity of campaign exposure

Campaign success hinges on achieving adequate levels of exposure.[32] It is therefore critical that campaign sponsors carefully consider the frequency with which, and over what period of time, a campaign is to be broadcast. More specifically, campaign sponsors need to know if exposure effects will be short-lived or sustained. They also need to know whether the relationship between exposure and smoking behavior is linear in nature, or alternatively, if there are exposure thresholds below which positive effects will not be observed or above which additional exposure will not produce additional gains.[2, 8] Such questions (RQ2a) are best addressed by studies using behavioral outcomes and objective measures of campaign activity. In the Surgeon General’s report,[2] the reviewers considered three studies that explored the relationship between advertising exposure levels and smoking prevalence among youth and young adults.[33-35] These studies provided evidence of a mostly linear relationship between exposure and smoking behavior,[33-35] that appeared to start at a minimum of one antitobacco advertisement every four months[33] and a maximum threshold of around 16 ads per four months.[34] An additional three studies provided evidence that reduced funding for antitobacco campaigns slowed down rates of decline in or even increased the prevalence of youth smoking.[36-38]

In the current review, we identified an additional three studies that examined effects of the duration and intensity of campaign exposure.[10-12] In their evaluation of the national truth® campaign, Farrelly and colleagues provided additional evidence of a linear relationship between cumulative exposure (over a period of up to five years) and a decreased risk of initiation.[10] In a more recent study that collected data over 16 years, White and colleagues examined both the
intensity and duration of exposure required for effects.[11] First, by relating survey measures of youth smoking prevalence to objective measures of the amount of antitobacco advertising in the three months and 12 months prior to each survey, they found an exposure threshold below which positive effects were not observed at approximately 5800 cumulative TRPs over 12 months (an average of 480 TRPs/month). They also examined whether advertising effectiveness was influenced by the period of time over which a given intensity of exposure was sustained. For the three months and 12 months prior to each survey, they computed the number of months that each student was exposed to antitobacco advertisements at each of three minimum levels: $\geq 100$ TRPs/month; $\geq 400$ TRPs/month; or $\geq 800$ TRPs/month. Notably, they found no positive effects of advertising at a minimum of $\geq 100$ TRPs/month, and the effects of the other two exposure levels depended on the duration of exposure: exposure to $\geq 400$ TRPs/month had to occur every month in order to have a positive effect on smoking rates, whereas if exposure levels of $\geq 800$ TRPs/month occurred on average only every second month, positive effects were still observed.[11] In their longitudinal study of uptake, reduction, and quitting over two-year periods among 20-30 year olds, Terry-McElrath and colleagues did not find any significant linear effects of 24-month cumulative exposure to antitobacco advertisements. However, in models predicting quitting among all smokers, and quitting or smoking reduction among daily smokers, they observed significant quadratic effects, where positive effects were not observed until an exposure threshold of 10400 GRPs was reached over 24 months.[12] While data suggested a maximum threshold above which additional exposure did not further increase the odds of quitting among all smokers, no such point of diminishing returns was observed in the models predicting reduction or quitting among daily smokers.[12]
Sub-group differences in campaign effectiveness

Only a small number of studies were available to the authors of the Surgeon General’s report when they considered the influence of demographic and personality characteristics such as gender, race/ethnicity, socioeconomic status, and sensation seeking on campaign effectiveness.[2] Other than some indications that youth from lower socioeconomic groups were most adversely affected by the withdrawal of campaign funding and mixed results for the impact of sensation seeking, on the whole, the reviewed studies did not show systematic evidence of differences by sub-groups.[2]

Building on this, we examined whether the 21 studies included in this part of the review provided evidence that campaign effectiveness varied among different sub-groups (RQ2b). The strongest evidence for differential effects is provided by analyses that statistically test the interaction between exposure and individual characteristics. Of the 21 studies, only three conducted such tests[18, 21, 25] (Table 1). One study examined whether the effect of seeing a single antitobacco advertisement before a movie differed for youth (10-17 year olds) and adults (18-90 year olds), but found no evidence of moderation.[25] Cowell and colleagues[18] found that the truth® campaign had a more positive effect on intentions not to smoke among African-American than among Asian never smokers, while African-Americans vs. Whites and African-Americans vs. Hispanics comparisons were not significant.[18] Similarly, Nasim and colleagues[21] found stronger effects on intentions among African-American never smokers than among all others (Whites and Hispanics combined), and the exposure effects were strongest among African-American experimental smokers and weakest among White experimental smokers.[21]
An additional nine studies reported effects separately by sub-groups, but did not test whether exposure effects were statistically moderated by these audience characteristics.[15, 16, 20, 22-24, 26, 27, 29] Five of these studies[20, 22, 23, 26, 29] provided sufficient data to allow us to test the magnitude of the difference between the sub-groups ourselves (i.e., they reported standard errors/confidence intervals around the estimate for each group, allowing us to conduct a t-test on the difference between the means). These analyses provided further evidence that campaign effects did not differ across sex,[22, 29] age groups,[26], sensation seeking,[20] and smoking status (experimenters vs. triers).[23]

**Effectiveness of different message themes, strategies and executional characteristics**

Drawing on the findings of previous reviews, and from five newer studies that directly compared advertisements, the authors of the Surgeon General’s report[2] concluded that messages that evoked strong negative emotions and were about the tobacco industry or the health effects of smoking and secondhand smoke were most likely to change beliefs and intentions. Building on this, we also examined the extent to which message themes, strategies, and executions were associated with effectiveness. In total, we identified 22 studies that explicitly compared different message themes or characteristics. Appropriately, most of these studies used forced exposure designs, with the exception of two studies that used a longitudinal[12] or cross-sectional[39] design to evaluate real campaigns.

We used this body of studies to address RQ2c and RQ2d. A summary of the findings are presented in Table 2 (Appendix B contains additional details). In reviewing these studies, we examined those that compared message themes and strategies (15 of 22) separately from those
that compared different message formats and executional characteristics (14 of 22; note that six studies examined the effects of both themes and formats).

**Message themes and strategies**

Of the 15 studies that compared different message themes and strategies, 10 compared the effectiveness of messages about the negative health effects of smoking (NHE) with other themes including: anti-tobacco industry;[39-46] secondhand smoking;[40-42, 47] social norms;[39-42, 46, 47] social consequences;[48] addiction;[44, 49] and short-term effects.[39, 44] Of these 10 studies, two found no difference between themes.[47, 48] Six studies provided descriptive[40] or statistical evidence that NHE messages were the most effective on outcomes such as perceived effectiveness,[41, 42] self-efficacy,[43, 44] and pro-smoking beliefs.[45] One of these studies[43] also found that messages emphasizing the long-term NHE of smoking led to higher self-efficacy to resist smoking than messages about short-term NHE, which still led to higher self-efficacy than anti-tobacco industry messages.[43] Two additional studies found that the effectiveness of NHE messages was conditional on participant characteristics such as smoking status (NHE messages most effective for smokers but not for nonsmokers)[46] and stage-of-change (NHE messages most effective for precontemplators but not for contemplators and preparers).[49] One study produced more mixed findings.[39] It tested six messages that used four different themes and found that NHE messages ranked both highest and lowest on confirmed recall and perceived effectiveness, a finding that helps to demonstrate that campaign effectiveness is influenced by features of the message other than just the broad theme.
For example, two studies considered whether the message referred to the consequences of smoking for the self or others.[50, 51] One found that other-referring messages produced higher perceived susceptibility to harms than self-referring messages,[50] while the other found an interaction with smoking status such that other- and self-referring messages were more effective, respectively, for nonsmokers and smokers.[51] Considering that nonsmokers comprised the majority of the first study’s sample, the findings from these two studies consistently suggest that other-referring messages may be more effective for nonsmokers, who are unable to identify with messages that refer to the consequences of smoking for the self.

The remaining three studies examined other strategies including the richness of the argument,[52] the use of competing arguments regarding the attractiveness, prevalence, and social disapproval of smoking,[53] and the sponsor of the message.[12] Details for all of these studies are provided in Table 2, but because each of these strategies was examined in only one study in the sample, we are reluctant to draw conclusions from these findings.

*Message formats and executional characteristics*

Of the 14 studies that examined different message formats and executional characteristics, six examined the effects of eliciting different types of emotional responses and produced mixed results.[41, 45, 54-57] One study found that messages eliciting high fear were more effective at lowering beliefs about the acceptability of smoking than those eliciting low fear,[45] and another found messages evoking high (compared to low) levels of fear or disgust produced higher levels of attention and recognition.[54] In another study, dramatic messages were more effective than humorous and sarcastic messages.[41] Carter and colleagues found that the more amusing of two
high-disgust messages was no less effective (than the less amusing message) in terms of believability and impact on intentions.[56] Similarly, Adams and colleagues observed no differences in the effectiveness of message combinations intended to evoke fear and relief, or sadness and joy,[57] and Goetz found no difference between messages that evoked only fear or both fear and disgust.[55]

Two studies found little evidence that the use of gain or loss frames matter for message effectiveness,[48, 50] although there was some evidence that gain frames made smokers feel more susceptible to the health effects of smoking.[50]

The remaining six studies examined other message formats and executional characteristics including: actor appeal;[43] message language;[46] presence of an epilogue;[53] message sensation value;[58] explicitness of delivery;[59] and the use of graphic, simulated or testimonial NHE messages.[60] Details for all of these studies are provided in Table 2; however, because each of these message characteristics was examined in only one study, it is difficult to draw definitive conclusions.

Sub-group differences in the effectiveness of different message themes, strategies and executional characteristics

Of the 22 studies that examined the effectiveness of different message themes, strategies, formats and executional characteristics, 13 included some statistical analysis of whether the effectiveness of these message features varied according to audience demographic and personality characteristics (RQ2d). Interactions between message and audience characteristics were not
explicitly considered in the Surgeon General’s report;[2] thus, this is the first time this question has been considered systematically.

Gender moderation effects were tested in five studies,[39, 43, 45, 52, 56] four of which observed some differences between males and females. Vogeltanz-Holm and colleagues found differences in which specific NHE messages received the highest perceived effectiveness scores from either 12-17 year old girls or boys,[39] and Samu et al. found some evidence that university-aged females responded more favorably to high-fear messages than males.[45] Flynn and colleagues showed that girls engaged in greater peripheral processing and better liked messages that included only peripheral antitobacco arguments, but that boys and girls did not differ in their processing of argument-rich messages.[52] Carter and colleagues found that males and females rated two disgusting messages similarly on disgust but that males were more likely to find them amusing and funny and less likely to find them revolting.[56]

Age moderation effects were tested, and found to be non-significant, in one study with 11-17 year olds.[43] Other studies compared the responses of younger (<18; 18-29) and older adults[56][60] and did not find that the responses of youth and young adults differed from those of older adults.

Race/ethnicity effects were tested in four studies, two of which found no differences.[39, 43] One study found that European-American youth gave higher message strength ratings to NHE messages than did African-American youth (although for African-Americans, NHE messages were still rated the highest of five themes).[44] In another study, there were mixed findings for
the extent to which Hispanic, African-American and Caucasian youth centrally and peripherally processed messages that were either rich or light in antitobacco arguments.\[52\]

Six studies tested whether smokers and non-smokers differed in their responses to different message themes and characteristics,\[43, 46, 50, 51, 53\] with five of these observing some differences in the effectiveness of gain- and loss-frames,\[50\] self- and other-referring messages,\[51\] persuasive epilogues in television programs,\[53\] and different message themes.\[46, 53\] One study found differences in the fear and disgust ratings given to messages according to whether respondents were light or moderate smokers,\[55\] and another found that NHE messages were more effective than addiction messages for those in the precontemplation stage-of-change, whereas the reverse was true for those in contemplation and preparation.\[49\]

All other individual characteristics—including self-regulatory focus,\[57\] independent vs. interdependent self-construal,\[51\] academic achievement,\[52\] and acculturation\[46\]—were each examined in only one of the studies included in this review, precluding us from drawing substantive conclusions.
<table>
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<td>Adams et al., 2011</td>
<td>Between-subjects; emotional tone</td>
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<td>Bresnahan et al., 2013</td>
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<td>Yes (smoking status)</td>
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<td>Effect on unique website hits &amp; ad ratings</td>
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<td>Mixed design experiment; argument strategy</td>
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<td>N/A</td>
<td>Yes (gender, race/ethnicity, academic achievement)</td>
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<td>Goetz, 2011</td>
<td>Mixed design experiment with follow-up; fear vs. fear+disgust</td>
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<td>Mixed design experiment; theme, language</td>
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<td>N/A*</td>
<td>No effect</td>
<td>Yes (smoking status, acculturation)</td>
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<td>Kuang,</td>
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<td>No effect</td>
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<td>N/A</td>
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<td>Langleben et al., 2009[58]</td>
<td>Forced exposure to all ads; message sensation value</td>
<td>18–48; N=18; US</td>
<td>Effect on recognition accuracy &amp; response time</td>
<td>N/A</td>
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<td>Leshner et al., 2009[54]</td>
<td>Within-subjects; high/low fear vs. disgust</td>
<td>University students; N=58; US</td>
<td>Effect on attention &amp; recognition accuracy, recognition sensitivity, &amp; recognition confidence</td>
<td>N/A</td>
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<td>Effect on PE N/A</td>
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<td>Pechmann et al., 2010[53]</td>
<td>Between-subjects; S1: attractiveness/ prevalence/disapproval (APD) S2: APD, epilogue</td>
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<td>S1 &amp; S2: Yes (smoking status)</td>
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<td>Shadel et al., 2009[43]</td>
<td>Mixed design experiment; theme, actor appeal</td>
<td>11-17; N=110; US</td>
<td>Effect on self-efficacy</td>
<td>No effect None</td>
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<tr>
<td>Shadel et al., 2009[43]</td>
<td>Mixed design experiment; theme, actor appeal</td>
<td>11-17; N=110; US</td>
<td>Effect on self-efficacy</td>
<td>N/A</td>
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<td>Sample Size</td>
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<td>2010[59]</td>
<td>implicit vs. explicit message</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
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<td>N/A</td>
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<td>Terry-McElrath et al., 2013[12]</td>
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<td>2010[44]</td>
<td>Mixed design experiment; theme</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
<td>11-17; N=94; US</td>
<td>Effect on self-efficacy</td>
<td>N/A</td>
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<td>Tharp-Taylor et al., 2012[44]</td>
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<td>2010[40]</td>
<td>Forced exposure to all ads; theme</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
<td>12-19; N=95; Greece</td>
<td>Effect on recall &amp; PE</td>
<td>N/A</td>
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<td>Vardavas et al., 2010[40]</td>
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<td>2008[49]</td>
<td>Between-subjects; theme University students; N=200; UK</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
<td>12-17; N=391; US</td>
<td>Effect on recall &amp; PE</td>
<td>N/A</td>
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<td>Veer et al., 2008[49]</td>
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<td>2009[39]</td>
<td>Cross-sectional survey; theme</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
<td>12-17; N=391; US</td>
<td>Effect on recall &amp; PE</td>
<td>N/A</td>
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<td>2013[60]</td>
<td>Forced exposure to all ads; graphic vs. simulated vs. testimonial negative health effects ads</td>
<td>Longitudinal cohort; anti-tobacco vs. pharmaceutical vs. tobacco industry</td>
<td>18-34; N=2399; Bangladesh, China, Egypt, India, Indonesia, Mexico, Philippines, Russia, Turkey, Vietnam</td>
<td>Effect on message acceptance, PE, discomfort, &amp; likelihood of discussing ad</td>
<td>N/A</td>
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<td>Wakefield et al., 2013[60]</td>
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*Note. Full details for each study are provided in Appendix B. PE = perceived effectiveness. N/A = outcome not measured in study; N/A* = main effects not tested statistically OR not reported in study

* Study also included in Table 1 (due to additional findings regarding the overall effect of the campaign on intentions/behaviors).
DISCUSSION

The findings from our review of campaign evaluation studies published between July 2008 and August 2013 add weight to the conclusions reached in the 2012 Surgeon General’s report[2]: on the whole, there is strong evidence that mass media interventions can positively affect tobacco use intentions and behaviors of youth and young adults. Positive effects reported in earlier reviews have not been lost in more recent time periods. Campaign exposure was associated with positive changes in intentions and behaviors in 14 of 21 studies, and there was no evidence of negative overall effects. Critically, the three studies that used the especially strong approach of relating objective measures of exposure to behavioral changes over time all demonstrated positive effects. Supportive evidence was provided by an additional five longitudinal studies and six cross-sectional studies. One controlled field trial produced no effect, although the authors identified several extraneous factors likely responsible for these null results.

Of note is that many of the positive effect studies evaluated campaigns not necessarily directed at youth and young adults. By using objective (GRPs or TRPs) and self-report measures of exposure to any or all antitobacco advertisements aired over a particular time period, these studies likely captured the effects of a mix of adult- and youth-targeted messages. For example, we know that in the Australian study that found an inverse relationship between exposure and youth smoking prevalence, the campaign environment was dominated by adult-targeted messages.[11] It has been suggested that adult-targeted campaigns may affect young people by changing broader social norms about tobacco use,[2, 3] but it is also possible that youth are directly impacted by the information presented about the consequences of tobacco use, in the same way as adults. Irrespective of the mechanism, these findings indicate that scarce campaign
resources may be maximized by prioritizing campaigns targeted at encouraging adults to quit, as these messages seem able to affect the tobacco-related behaviors of youth, young adults and adults.

Insight into the optimal duration and intensity of campaign activity was provided by two studies in particular, [11, 12] both of which suggested exposure thresholds below which positive effects are unlikely to be observed. Despite differences in the setting (Australia, US), age group (secondary school students, young adults), and outcome behavior (smoking prevalence, quitting), these studies provided consistent evidence that campaigns should be aired at an intensity of between 1200-1400 GRPs/TRPs per quarter. In order to achieve this total amount of aggregated activity, campaigns can either be aired consistently every month at lower levels (i.e., 400 TRPs) or every second month at a higher level (i.e., 800 TRPs).[11] By providing critical practical information regarding the precise amount of monthly campaign activity and the duration over which this advertising needs to be on air, these findings help to assure campaign planners that investment in developing and airing these campaigns will be fruitful.

It is evident from the studies included in this review that campaign potential is not always fully realized. Our assessment of the effectiveness of different message themes, strategies and executional characteristics adds some weight to the conclusion of the Surgeon General’s report, which determined that the most effective messages were those that used information about the health effects of smoking and secondhand smoke, and about the actions of the tobacco industry, to evoke negative emotional reactions.[2] We identified 10 studies that compared the effectiveness of NHE messages with other themes, and six provided evidence favoring the NHE
message. Evidence that messages are more effective when they elicit a negative emotional response was more limited, although the six studies that addressed this typically found that emotional evocation enhanced message effects. Beyond the broad theme and emotional quality of the messages, other message characteristics—such as gain vs. loss framing, message sensation value, and the use of graphic or testimonial messages—were tested by only one or two of the studies included in this review, precluding us from drawing conclusions about the effectiveness of these approaches. There remains much to learn about the message characteristics that facilitate campaign impact, and the studies reviewed here help to demonstrate the large number of message characteristics available to message designers. Systematic research comparing the impact of different message themes, strategies, and executional characteristics—ideally through head-to-head comparisons—will continue to be welcome.

Fewer than half of the studies that assessed overall campaign effectiveness also tested (or provided data that allowed us to test) whether effectiveness varied according to audience characteristics, making it difficult for us to draw strong conclusions. Yet, the absence of any systematic evidence of differences by sub-groups is consistent with previous reviews of campaign effects among both adults[3, 8, 61] and youth.[2, 3] We also reviewed, for the first time, whether the effectiveness of particular message themes, strategies, formats and executional characteristics was moderated by audience characteristics. Although some of the 13 studies that addressed this issue did find differences according to sex, race/ethnicity, and smoking status, in no instance did more than one study provide evidence of moderation of the effects of a specific message characteristic. These findings contribute to an ongoing debate as to whether antitobacco mass media messages should be targeted to specific audience groups (for example, see [62-69]).
Although targeting may help to increase the relevance of the message,[70] this strategy also requires that multiple messages are developed, thereby increasing the costs associated with developing and airing these messages. By comparison, the weight of current evidence suggests that resources should be directed at increasing the reach of broadly-targeted and unified campaign strategies, rather than to developing different strategies for different segments of the audience. However, it is also apparent that further research is required to more thoroughly examine the role that audience characteristics do (or do not) play in determining campaign success.

Antitobacco mass media interventions are almost always implemented in conjunction with or in the context of other tobacco control interventions. This is appropriate, as gains in tobacco control are most likely to be seen when multi-faceted approaches that combine and create synergies between a range of educational, clinical, economic, and regulatory strategies are adopted.[5, 71-73] However, it can also make it difficult to isolate the effects of the campaign. Nonetheless, most of the reviewed studies were able to relate specific measures of campaign exposure to changes in outcomes, and many employed statistical controls to capture the influence of the broader tobacco control environment. Further increasing our confidence in the conclusions of this review, evidence of campaign effectiveness was provided by studies that used different methodologies, study populations and settings, exposure measures, and outcome behaviors (intentions, initiation, cessation) and that evaluated both single campaigns and the effect of any exposure to any campaigns over a given time period. This heterogeneity, along with the small number of studies which shared any one design, outcome measure, and campaign characteristic, meant that we did not think that a formal meta-analysis was appropriate. Still, in our narrative
synthesis we gave the most weight to studies with the strongest methodological quality. As with all reviews, our search results likely reflect a publication bias that favors those evaluation studies in which the campaign produced the expected results. Further, most studies were conducted with youth (under the age of 18) and in high-income countries, limiting the generalizability of these results. Recent research with adult smokers and non-smokers has indicated that the messages that are most effective in high-income countries like Australia also show the greatest potential for effectiveness in low- and middle-income countries.[60, 74-76] Similar studies with youth and young adults could explore the possibility that existing campaigns could be adapted or recycled for use in new populations, increasing resources available for achieving sufficient exposure.[77]

**Conclusion**

Investment in antitobacco mass media interventions has continued over recent years: as one notable example, in 2013 the US Food and Drug Administration announced their intention to spend $600 million over five years on campaigns to discourage initiation and encourage smoking cessation,[78] and several phases of this campaign have now been launched.[79] Overall, the findings of this review indicate that this investment is likely to have a positive effect on the tobacco-related intentions and behaviors of youth and young adults, potentially contributing to reductions in population smoking prevalence. Yet, there is a continued need for research that measures the impact of these campaigns, compares the relative effectiveness of different campaigns and campaign messages, and examines the differential responsiveness of population sub-groups.
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REFERENCES


64 Parvanta S, Gibson L, Moldovan-Johnson M, et al. Race and gender moderation of the relationship between cessation beliefs and intentions: is race or gender message


APPENDICES

APPENDIX A: Studies Assessing the Effectiveness of Antitobacco Mass Media Interventions among Youth and Young Adults

<table>
<thead>
<tr>
<th>Authors</th>
<th>Campaign Details</th>
<th>Study Design, Analytic Sample &amp; Location</th>
<th>Exposure Measures</th>
<th>Outcome Measures &amp; Control Variables</th>
<th>Effects</th>
<th>Sub-Group Differences</th>
</tr>
</thead>
</table>
| Cowell et al., 2009[18] | **Campaign:** national “truth” campaign  
**Target theme:** negative health effects, industry manipulation  
**Target audience:** youth (12-17 year olds)  
**Medium:** TV  
**Duration of exposure:** varied according to survey wave (up to 3 years; “truth” launched in 2000)  
**Intensity of exposure:** not specified  
**Other components of the campaign:** none specified | **Design:** cross-sectional (combined data from 7 waves between December 1999 & July 2003)  
**Analytic sample:** 12-17 year olds (N=22,220 never smokers; N=5,079 non-current ever smokers) (nationally representative sample)  
**Location:** US | **Analytic measures:** confirmed awareness  
**Descriptive measures:** confirmed awareness  
**Wave I:** 0%  
**Wave II:** 75%  
**Wave III:** 38%  
**Wave IV:** not reported  
**Wave V:** ~66%  
**Wave VI:** ~66%  
**Wave VII:** ~66%  
**Wave VIII:** 74%  
**Primary outcome measures:** intention not to smoke (next 12 months)  
**Control variables:** individual characteristics; exposure to Philip Morris’ “Think. Don’t Smoke” campaign, which aired at the same time | **Primary outcome measures:** intention not to smoke for never smokers, pos. effect; for non-current ever smokers, pos. effect | None examined |
| Davis et al., 2009[13]  | **Campaign:** national “truth” campaign & Philip Morris’ “Think. Don’t Smoke” campaign  
**Target theme:** “truth”: negative health effects, industry manipulation; “Think. Don’t Smoke”: smoking doesn’t lead to social popularity, not smoking is an assertion of independence | **Design:** longitudinal cohort, with 3 waves between 2000 & 2002  
**Analytic sample:** N=10,919–11,348 baseline non-current smokers who were not open to smoking (intention analyses); N=11,741 baseline non-current smokers (behavior analysis); N=13,195 baseline non-current smokers | **Analytic measures:** prompted recall at waves 2 & 3 (combined into low, medium & high levels of exposure)  
**Descriptive measures:** prompted recall: “truth”: 15% low; 54% medium; 31% high; “Think. Don’t Smoke”: 36% low; 57% medium; 7% high  
**Primary outcome measures:** initiation at wave 3 (2 measures: to current smoking among baseline non-current smokers; to established smoking among baseline non-established smokers); intentions to smoke at wave 3 (5 measures)  
**Control variables:** “truth” initiation | **Primary outcome measures:** initiation at wave 3 (2 measures: to current smoking among baseline non-current smokers; to established smoking among baseline non-established smokers); intentions to smoke at wave 3 (5 measures)  
**Control variables:** | Race/Ethnicity (White vs. African American vs. Hispanic vs. Asian) for never smokers, pos. effect for African-Americans & non-sig. effects for other groups (but in pos. direction for Whites & Hispanics); African Americans > Asians; no other sig. pairwise comparisons; for non-current ever smokers, pos. effect for all groups; no sig. differences between groups |

*Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at pc.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.*

*Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pro-tobacco marketing. The type and actual number of control variables varied in each study.*

*Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).*
Target audience: youth (12-17 year olds)<br>Medium: TV<br>Duration of exposure: varied according to survey wave (up to 3 years)<br>Intensity of exposure: not specified<br>Other components of the campaign: none specified<br>Established smokers (behavior analysis); students in grades 6-12 from a total of 83 schools (in 10 school districts)<br>Location: US<br>Individual characteristics*; community-level characteristics; ad recall at baseline; intentions at baseline; adjusted for clustering within schools<br>Measures: pos. dose-response relationship between recall & intentions to “try a cigarette soon” & intentions to “be smoking cigarettes 5 years from now”<br>“Think. Don’t Smoke” initiation no effect
Intensions to smoke neg. effect of medium (vs. low) exposure for 1 of 5 measures; neg. effect of high (vs. low) exposure for 1 of 5 measures (intentions to “try a cigarette soon”)

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Dietz et al., 2010[15]<br>Campaign: Florida “truth” campaign<br>Target theme: industry manipulation<br>Target audience: youth (12-17 year olds)<br>Medium: TV<br>Duration of exposure: varied according to survey wave (up to 3 years)<br>Intensity of exposure: not specified<br>Other components of the campaign: none specified<br>Design: longitudinal, with 6 cross-sectional waves during the campaign, from 1998-2001, & 2 cross-sectional waves post-campaign in 2004 & 2006<br>Analytic sample: N=1800 12-17 year olds in each survey wave<br>Location: US (Florida)<br>Analytic measures: timing; baseline vs. final campaign wave; final campaign wave vs. post-campaign wave 1; post-campaign wave 1 vs. post-campaign wave 2<br>Descriptive measures: confirmed awareness of at least 1 ad: 93% in 1999; 64% in 2004 (post-campaign wave 1); 11% in 2006 (post-campaign wave 2)<br>Primary outcome measures: prevalence (smoked in past 30 days)<br>Control variables: none specified<br>Prevalence declined from baseline to final campaign wave in 2001; declined from final campaign wave until post-campaign wave 1; increased from post-campaign wave 1 to post-campaign wave 2 (but not sig. for total sample, sig. only for >16 year olds)<br>Age effects reported separately by age, but int. not statistically tested

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* Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s. TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

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* Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
| Farrelly et al., 2009[19] | Campaign: national “truth” campaign & Philip Morris’ “Think. Don’t Smoke” campaign  
Target theme: “truth”: negative health effects, industry manipulation; “Think. Don’t Smoke”: smoking doesn’t lead to social popularity, not smoking is an assertion of independence  
Target audience: youth (12-17 year olds)  
Medium: TV  
Duration of exposure: varied according to survey wave (up to 4 years; “truth” launched in 2000)  
Intensity of exposure: not specified  
Other components of the campaign: none specified | Design: cross-sectional (combined data from 8 waves between 2000 & 2003)  
Analytic sample: N=35,074 12-17 year olds (analyses predicting intentions limited to never smokers, but N not specified) (nationally representative sample)  
Location: US | Analytic measures:  
1) confirmed awareness; 2) cumulative GRPs; 3) quadratic term for cumulative GRPs; 4) indicator variable for whether “Think. Don’t Smoke” was on or off the air  
Descriptive measures: confirmed awareness of “truth” ~70% for most waves; awareness of “Think. Don’t Smoke” 63-75% | Primary outcome measures: intention not to smoke (next 12 months)  
Control variables: individual characteristics; state-level characteristics; time/year | “truth” intention not to smoke  
pos. effect of confirmed awareness; pos. effect of cumulative GRPs; non-sig. effect of quadratic GRPs (p=.07)  
“Think. Don’t Smoke” intention not to smoke  
on-sig. neg. effect of confirmed awareness (p=.06); no effect of indicator variable | None examined |
| Farrelly et al., 2009[10] | Campaign: national “truth” campaign  
Target theme: negative health effects, industry manipulation  
Target audience: youth (12-17 year olds)  
Medium: TV  
Duration of exposure: varied according to survey wave (up to 4 years; “truth” launched in 2000) | Design: longitudinal cohort, with 8 waves between 1997 & 2004  
Analytic sample: N=8904 12-17 year olds (at baseline survey in 1997) (nationally representative sample)  
Location: US | Analytic measures: cumulative GRPs  
Descriptive measures: see intensity of exposure section | Primary outcome measures: initiation  
Control variables: individual characteristics; media market-level characteristics; state-level characteristics; time/year | initiation  
pos. effect of cumulative GRPs | None examined |

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* Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
<table>
<thead>
<tr>
<th>Campaign</th>
<th>Target theme</th>
<th>Target audience</th>
<th>Medium</th>
<th>Duration of exposure</th>
<th>Intensity of exposure: <strong>TV</strong>: 380 GRPS/week in January-May &amp; August-September of each year</th>
<th>Intensity of exposure: <strong>Radio</strong>: 215 GRPs/week in June-July of each year</th>
<th>Other components of the campaign: none specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flynn et al., 2010[24]</td>
<td>Social norms, self-efficacy, positive &amp; negative outcome expectations</td>
<td>Youth (3 different target age groups: grades 4-6; 7-8; 9-12)</td>
<td>TV &amp; radio</td>
<td>up to 4 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaign: created for study</td>
<td>Target theme: social norms, self-efficacy, positive &amp; negative outcome expectations</td>
<td>Target audience: youth (3 different target age groups: grades 4-6; 7-8; 9-12)</td>
<td>Medium: TV &amp; radio</td>
<td>Duration of exposure: up to 4 years</td>
<td>Intensity of exposure: TV: 380 GRPS/week in January-May &amp; August-September of each year</td>
<td>Intensity of exposure: Radio: 215 GRPs/week in June-July of each year</td>
<td>Other components of the campaign: none specified</td>
</tr>
<tr>
<td>Hanewinkel et al., 2010[25]</td>
<td>Negative health effects</td>
<td>General audience</td>
<td>PSAs shown in cinema</td>
<td>Design: quasi-experimental field trial: treatment (PSA shown before movie in the cinema) &amp; control (no PSA shown) conditions</td>
<td>Analytic sample: N=1148 10-17 year old cinema audience</td>
<td>Analytic measures: treatment vs. control condition</td>
<td>Primary outcome measures: intention to smoke (next 12 months)</td>
</tr>
<tr>
<td>Campaign: “Factual Romance” (single ad)</td>
<td>Target theme: negative health effects</td>
<td>Target audience: general audience</td>
<td>Medium: PSAs shown in cinema</td>
<td>Design: quasi-experimental field trial: treatment (PSA shown before movie in the cinema) &amp; control (no PSA shown) conditions</td>
<td>Analytic sample: N=1148 10-17 year old cinema audience</td>
<td>Analytic measures: treatment vs. control condition</td>
<td>Primary outcome measures: intention to smoke (next 12 months)</td>
</tr>
</tbody>
</table>

**Note.** Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

*Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pro-tobacco marketing. The type and actual number of control variables varied in each study.*

*Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).*
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<thead>
<tr>
<th>Study</th>
<th>Campaign</th>
<th>Target theme</th>
<th>Target audience</th>
<th>Medium</th>
<th>Duration of exposure</th>
<th>Intensity of exposure</th>
<th>Other components of the campaign</th>
<th>Design</th>
<th>Analytic sample</th>
<th>Analytic measures</th>
<th>Primary outcome measures</th>
<th>Control variables</th>
<th>Primary outcome measures</th>
<th>Race/Ethnicity</th>
<th>Sensation Seeking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kandra et al., 2013[20]</td>
<td>“Tobacco. Reality. Unfiltered.” (TRU)</td>
<td>negative health effects</td>
<td>youth (11-17 year olds)</td>
<td>TV</td>
<td>&lt; 6 months for 2004 sample &amp; up to 5 years for 2009 sample</td>
<td>campaign expenditure: $2.7 million 2004-2005; $1.7 million 2005-2006; $4.5 million 2006-2007; $5 million 2007-2008; $5 million 2008-2009</td>
<td>tobacco-free colleges program; teen coalitions (education, awareness, &amp; policy activities)</td>
<td>cross-sectional with 2 waves, 2004 &amp; 2009</td>
<td>N=604 11-17 year olds in 2004 (mean age=14); N=1,154 11-17 year olds in 2009 (mean age=14; recruited from a random probability sample of North Carolina households; weighted)</td>
<td>confirmed awareness</td>
<td>prevalence (2 measures: smoked in past 30 days; ever puffed)</td>
<td>individual characteristics*</td>
<td></td>
<td>Sensation Seeking</td>
<td>effects reported separately by sensation seeking, but int. not statistically tested</td>
</tr>
<tr>
<td>Nasim et al., 2009[21]</td>
<td>any recalled ads about the dangers of cigarette smoking, September 2007-April 2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cross-sectional</td>
<td>N=1,338 never smokers &amp; N=353 experimental</td>
<td>semi-prompted recall (past 30 days)</td>
<td>intention to smoke (effects only reported separately by smoking status) for never smokers, pos. effect; for</td>
<td></td>
<td></td>
<td>Race/Ethnicity</td>
<td>for never smokers, sig. int. with African-American race/ethnicity, such that exposure</td>
</tr>
</tbody>
</table>

Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

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---

**Target theme:** negative health effects  
**Target audience:** N/A  
**Medium:** TV, radio & the Internet  
**Duration of exposure:** N/A  
**Intensity of exposure:** not specified  
**Other components of the campaign:** N/A

<table>
<thead>
<tr>
<th>Design</th>
<th>Analytic measures</th>
<th>Primary outcome measures</th>
<th>Control variables</th>
<th>Intention to smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td>cross-sectional</td>
<td>semi-prompted recall (past 30 days)</td>
<td>intention to smoke (effects only reported separately by school grade/smoking status)</td>
<td>individual characteristics; smoking-related beliefs &amp; attitudes; 8 2-way int. between exposure &amp; social influence variables</td>
<td>for middle school triers, no main effect &amp; no sig. int. for high school experimenters, no main effect but sig. int. between exposure &amp; family smoking, such that higher exposure increased intentions for those who lived with family members who smoked for high school triers, no main effect but sig. int. between exposure &amp; parental monitoring, such that higher</td>
</tr>
</tbody>
</table>

Paek, 2008[23]  
Campaign: any antismoking messages recalled  
Target theme: N/A  
Target audience: N/A  
Medium: TV, radio, internet, billboards or outdoor signs & magazines  
Duration of exposure: N/A  
Intensity of exposure: not specified  
Other components of the campaign: N/A

<table>
<thead>
<tr>
<th>Design</th>
<th>Analytic measures</th>
<th>Primary outcome measures</th>
<th>Control variables</th>
<th>Intention to smoke</th>
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<thead>
<tr>
<th>Study</th>
<th>Campaign</th>
<th>Target theme</th>
<th>Target audience</th>
<th>Medium</th>
<th>Duration of exposure</th>
<th>Design</th>
<th>Analytic sample</th>
<th>Analytic measures</th>
<th>Primary outcome measures</th>
<th>Mediator variables</th>
<th>Control variables</th>
<th>Int. to smoke</th>
<th>Int. to quit</th>
<th>Path Analysis</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paek et al., 2011[14]</td>
<td>Campaign: any antismoking ads recalled</td>
<td>Target theme: N/A</td>
<td>Target audience: N/A</td>
<td>Medium: TV, radio, internet, magazines &amp; billboards</td>
<td>Duration of exposure: N/A</td>
<td>Design: longitudinal cohort, with 2 waves, spring &amp; fall 2003</td>
<td>Analytic sample: N=654 6th &amp; 8th grade students</td>
<td>Analytic measures: semi-prompted recall (past 30 days) (1 = none; 5 = more than once a day)</td>
<td>Primary outcome measures: smoking susceptibility</td>
<td>Mediator variables: perceived media influence on peers</td>
<td>Control variables: individual characteristics &amp; perceived risk from smoking</td>
<td>End of experiment</td>
<td>N/A</td>
<td>None examined</td>
<td></td>
</tr>
<tr>
<td>Richardson et al., 2010[28]</td>
<td>Campaign: national “truth” campaign</td>
<td>Target theme: negative health effects, industry manipulation</td>
<td>Target audience: youth (12-17 year olds)</td>
<td>Medium: TV</td>
<td>Duration of exposure: varied according to survey wave (up to 4 years) (“truth” launched in 2000)</td>
<td>Design: cross-sectional (combined data from 8 waves between 1999 &amp; 2004)</td>
<td>Analytic Sample: N=19,701 18-24 year olds (37% never smokers; 32% former smokers; 31% current smokers)</td>
<td>Analytic measures: confirmed awareness</td>
<td>Primary outcome measures: intention not to smoke (next 12 months; for never smokers &amp; former smokers); intention to quit (for current smokers)</td>
<td>Mediator variables: anti-smoking attitudes &amp; beliefs (9 measures)</td>
<td>Control variables: individual</td>
<td>End of experiment</td>
<td>N/A</td>
<td>None examined</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Campaign, Target Theme, &amp; Audience</th>
<th>Duration of Exposure</th>
<th>Intensity of Exposure</th>
<th>Other Components of the Campaign</th>
<th>Design</th>
<th>Analytic Measures</th>
<th>Primary Outcome Measures</th>
<th>Mediator Variables</th>
<th>Control Variables</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richardson et al., 2011[26]</td>
<td>6 months</td>
<td>not specified</td>
<td>none specified</td>
<td>longitudinal cohort, with a pre-campaign wave &amp; 6 month follow-up</td>
<td>confirmed awareness</td>
<td>quit attempts</td>
<td>campaign-targeted cognitions</td>
<td>individual characteristics; campaign-targeted cognitions at baseline; quit attempts at baseline</td>
<td>quit attempts among 18-24 year olds, no effect</td>
</tr>
<tr>
<td>Schmidt et al., 2009[27]</td>
<td>6 weeks</td>
<td>not specified</td>
<td>none specified</td>
<td>longitudinal cohort, with a pre-campaign wave &amp; during-campaign wave</td>
<td>time (pre / during-campaign)</td>
<td>intention to tell other experimenters not to smoke</td>
<td>intention to support smokers to quit tobacco use</td>
<td>smoking status &amp; age effects reported separately by smoking status &amp; age, but int. not statistically tested</td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Study</th>
<th>Campaign</th>
<th>Design</th>
<th>Analytic measures</th>
<th>Primary outcome</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seo et al., 2009[30]</td>
<td>any antismoking messages about the dangers of smoking recalled</td>
<td>cross-sectional with 2 waves, 2000 &amp; 2004</td>
<td>semi-prompted recall (past 30 days), categorized into low, medium, or high exposure</td>
<td>none effect in 2000 or 2004 (both measures)</td>
<td>None examined</td>
</tr>
<tr>
<td>Shah et al., 2008[22]</td>
<td>any antismoking media messages recalled</td>
<td>cross-sectional</td>
<td>semi-prompted recall (past 30 days)</td>
<td>smoking status (effects only reported separately by gender)</td>
<td>Gender effects reported separately by gender, but int. not statistically tested</td>
</tr>
<tr>
<td>Terry-McElrath et al., 2013[12]</td>
<td>antitobacco ads (state tobacco control programs, American Legacy)</td>
<td>longitudinal cohort, with surveys conducted every 2 years</td>
<td>measures of GRPs assigned to participants</td>
<td>no effect of linear or quadratic GRPs for all 3</td>
<td>None examined</td>
</tr>
</tbody>
</table>

Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. Pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

* Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to anti-tobacco marketing. The type and actual number of control variables varied in each study.

* Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at \( p < .05 \)); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.  

<table>
<thead>
<tr>
<th>White et al., 2008[17]</th>
<th>Campaign: 1 ad featuring “mouth cancer” warning label from cigarette packs &amp; 1 ad featuring “peripheral vascular disease” warning label from cigarette packs</th>
<th>Design: longitudinal, with 2 waves of cross-sectional data collected pre-intervention (year prior) &amp; post-intervention (6 months)</th>
<th>Analytic measures: time (pre-/post-intervention)</th>
<th>Primary outcome measures: cigarette consumption per week (among those who smoked during past week); smoking</th>
<th>types of ads</th>
<th>daily smoking uptake no effect of linear or quadratic GRPs for all 3 types of ads</th>
<th>quitting among all smokers no effect of linear GRPs for all 3 types of ads; pos. effect of quadratic &amp; categorical GRPs for anti-tobacco ads only, such that exposure to 10,400-15,500 GRPs over 24-months was associated with more quitting than exposure to &lt;5,200 GRPs</th>
<th>quitting among daily smokers no effect of linear or quadratic GRPs for all 3 types of ads; pos. effect of categorical GRPs for anti-tobacco ads only (similar effect to example above)</th>
<th>reduction or quitting among daily smokers no effect of linear or quadratic GRPs for all 3 types of ads; pos. effect of quadratic &amp; categorical GRPs for anti-tobacco ads only (similar effect to example above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation), pharmaceutical ads (including NRTs, bupropion), &amp; tobacco industry ads (corporate image advertising &amp; youth smoking prevention targeted at parents &amp; youth) that ran during 2001-2008</td>
<td>between 2001 &amp; 2008</td>
<td>2-year exposure to antitobacco ads was 13,900 GRPs, mean exposure to pharmaceutical ads was 22,100 GRPs &amp; mean exposure to tobacco industry ads was 15,500 GRPs</td>
<td>based on the media market they lived in &amp; the date of the follow-up survey: (1) cumulative GRPs over the 24 months prior to survey for the 3 type of ads; (2) a quadratic term for cumulative GRPs; (3) categorical version of cumulative GRPs (52 ad exposure [5200 GRPs] increments)</td>
<td>Descriptive measures: none specified</td>
<td>smoking behavior change: uptake; daily smoking uptake; quitting among all smokers; quitting among daily smokers; reduction or quitting among daily smokers</td>
<td>Control variables: individual characteristics; state-level characteristics; time/year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

None examined |  

None examined |

Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pro-tobacco marketing. The type and actual number of control variables varied in each study.  

Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
<table>
<thead>
<tr>
<th>Target theme:</th>
<th>negative health effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target audience:</td>
<td>adult smokers</td>
</tr>
<tr>
<td>Medium:</td>
<td>TV</td>
</tr>
<tr>
<td>Duration of exposure:</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Intensity of exposure:</td>
<td>not specified</td>
</tr>
<tr>
<td>Other components of the campaign:</td>
<td>graphic warning labels on cigarette packs</td>
</tr>
<tr>
<td>following implementation of cigarette pack warnings)</td>
<td></td>
</tr>
<tr>
<td>Sample:</td>
<td>N=2,432 high school students in 2005; N=2,050 high school students in 2006</td>
</tr>
<tr>
<td>Location:</td>
<td>Australia (Victoria)</td>
</tr>
<tr>
<td>Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).</td>
<td></td>
</tr>
</tbody>
</table>

White et al., 2015[11]

| Campaign: | all antismoking TV ads, 1993-2008 |
| Target theme: | negative health effects (mostly) |
| Target audience: | adult smokers (mostly) |
| Medium: | TV |
| Duration of exposure: | variable (analytic measure of exposure) |
| Intensity of exposure: | variable (analytic measure of exposure) |
| Other components of the campaign: | N/A |
| Design: longitudinal, with 6 waves of cross-sectional data collected every 3 years between 1993 & 2008 |
| Analytic sample: | N=82,479 high school students (ranging from N=12,314-N=16,611 depending on year) |
| (recruited from schools using a stratified 2-stage probability sample, with schools selected at the 1st stage & students at the 2nd stage; the number of students surveyed from each state was proportional to the population size of that state) |
| Location: | Australia |

Analytic measures: (1) cumulative TRPs over the 3 months prior to survey & over the 12 months prior to the survey, & a quadratic term for cumulative TRPs (2) number of months at which TRPs/month reached each of three levels: >100; >400; & >800 |

Descriptive measures: none specified |

Primary outcome measures: prevalence (smoked in past 30 days) |

Control variables: individual characteristics; state-level characteristics; adjusted for clustering within schools |

prevalence (1) 3-month cumulative TRPs inversely associated with prevalence; 12-month cumulative TRPs associated with prevalence only when the quadratic term was entered, indicating that very low levels of cumulative TRPs were associated with higher prevalence, but higher levels of cumulative TRPs were associated with lower prevalence (threshold = 5,800 TRPs per year) |

(2) Over 3-months: no effect of duration of advertising at ≥100 TRPs/month on prevalence; pos. effect of advertising at ≥400 TRPs/month only if sustained for all 3 |

None examined |

Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign. |

Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pro-tobacco marketing. The type and actual number of control variables varied in each study. |

Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics). |
| Wood et al, 2009[16] | **Campaign**: “Smarter than Smoking”  
**Target theme**: industry manipulation, cosmetic effects, smoking is expensive, effect on fitness & social acceptability of smoking  
**Target audience**: youth (10-15 year olds)  
**Medium**: TV, radio, cinema, mobile phone SMS, internet promotions & youth-related press  
**Duration of exposure**: up to 10 years  
**Intensity of exposure**: at least 2 media campaigns aired annually for an average of 5.4 weeks per campaign (ranging from 2-10+ weeks). Between 1995-2005, expenditure per person in the target audience months; pos. effect of advertising at ≥800 TRPs/month if sustained for at least 2 of 3 months  
Over 12 months: no effect (or neg. effect for 1 month) of duration of advertising at ≥100 TRPs/month on prevalence; pos. effect of advertising at ≥400 TRPs/month only if sustained for all 12 months; pos. effect of advertising at ≥800 TRPs/month only if sustained for 8-10 months | **Design**: longitudinal, with 10 waves of cross-sectional data collected annually between 1996 & 2005  
**Location**: Australia (Western Australia) | **Analytic measures**: time (pre-/post-campaign)  
**Descriptive measures**: awareness: at least 87% for all campaigns over the 10 years (with the exception of 1 adapted from overseas)  
**Primary outcome measures**: smoking status (never smoker vs. smoker)  
**Control variables**: none specified | **smoking status**  
pos. effect of time, such that the proportion of never smokers increased from 40% in 1996 to 61% in 2005, and the proportion of 14 year old smokers reduced 28% to 7% & the proportion of 15 year old smokers reduced from 43% to 14%  
**Age**  
effects reported separately by age, but int. not statistically tested |

Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pre-tobacco marketing. The type and actual number of control variables varied in each study.

Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at \( p < .05 \)); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

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### Zawahir et al., 2013[29]

<table>
<thead>
<tr>
<th>Campaign: any antismoking media messages recalled</th>
<th>Design: cross-sectional</th>
<th>Analytic measures: semi-prompted recall (past 30 days &amp; past 6 months; summed into exposure index, 0=mone to 9=a lot)</th>
<th>Primary outcome measures: smoking susceptibility</th>
<th>Country effects reported separately by country, but it’s not clear if int. effects were tested for media exposure variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target theme: N/A</td>
<td>Analytic sample: N=839 13-17 year old never smokers in Malaysia &amp; N=833 13-17 year old never smokers in Thailand (recruited using a stratified multistage cluster sampling design at the household level; weighted)</td>
<td>Descriptive measures: categorical version of exposure index: none or low (5.5% in Malaysia; 7.6% in Thailand); average (19.2% in Malaysia; 22.0% in Thailand); high (75.4% in Malaysia; 70.4% in Thailand)</td>
<td>smoking susceptibility (effects only reported separately by country and gender) in Malaysia, for both males and females, no effect; in Thailand, for both males and females, no effect</td>
<td></td>
</tr>
<tr>
<td>Target audience: N/A</td>
<td>Location: Malaysia &amp; Thailand</td>
<td>Control variables: individual characteristics, knowledge of health effects of smoking &amp; perceived health risk of smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium: TV, radio, billboards, posters, newspapers, magazines, advertisements before/after movies &amp; at disco/karaoke/lounges</td>
<td>Duration of exposure: N/A</td>
<td>Gender effects reported separately by gender, but it’s not clear if int. effects were tested for media exposure variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity of exposure: not specified</td>
<td>Other components of the campaign: N/A</td>
<td>Country effects reported separately by country, but it’s not clear if int. effects were tested for media exposure variable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other components of the campaign: school-based education programs, small grants & resources for schools, & smoking cessation resources at schools; Smarter than Smoking sponsorship of sports & arts events & activities involving youth; Smarter than Smoking involvement in youth-oriented publications, merchandise & websites as well as advocacy involvement to reduce tobacco promotion, availability & affordability.

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was an average of $2.34 (AUD $2.59)

- Other components of the campaign: any antismoking media messages recalled
- Target theme: N/A
- Target audience: N/A
- Medium: TV, radio, billboards, posters, newspapers, magazines, advertisements before/after movies & at disco/karaoke/lounges
- Duration of exposure: N/A
- Intensity of exposure: not specified
- Other components of the campaign: N/A

Design: cross-sectional

Analytic sample: N=839 13-17 year old never smokers in Malaysia & N=833 13-17 year old never smokers in Thailand (recruited using a stratified multistage cluster sampling design at the household level; weighted)

Location: Malaysia & Thailand

Analytic measures: semi-prompted recall (past 30 days & past 6 months; summed into exposure index, 0=mone to 9=a lot)

Descriptive measures: categorical version of exposure index: none or low (5.5% in Malaysia; 7.6% in Thailand); average (19.2% in Malaysia; 22.0% in Thailand); high (75.4% in Malaysia; 70.4% in Thailand)

Primary outcome measures: smoking susceptibility (effects only reported separately by country and gender) in Malaysia, for both males and females, no effect; in Thailand, for both males and females, no effect

Country effects reported separately by country, but it’s not clear if int. effects were tested for media exposure variable

Gender effects reported separately by gender, but it’s not clear if int. effects were tested for media exposure variable

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Note. Many studies measured other outcomes that were not considered relevant to the current review. These included knowledge of the health effects of tobacco use, tobacco-related beliefs and attitudes, and perceived effectiveness of the advertisements. pos. = positive effects (i.e., less smoking behavior; stronger intentions not to smoke); neg. = negative effect (i.e., more smoking behavior; weaker intentions not to smoke); sig. = significant/significantly (typically at \( p < .05 \)); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

- Individual characteristics control variables include demographic characteristics and smoking behaviors, and other factors known to influence smoking such as parental and friend smoking, exposure to pro-tobacco marketing. The type and actual number of control variables varied in each study.
- Study also included in Appendix B (due to additional findings that compared the effectiveness of different campaign themes or message execution characteristics).
APPENDIX B: Studies Comparing the Effectiveness of Different Message Themes, Strategies, and Executional Characteristics among Youth and Young Adults

<table>
<thead>
<tr>
<th>Authors</th>
<th>Message Details</th>
<th>Study Design, Message Exposure, Analytic Sample &amp; Location</th>
<th>Outcome Measures</th>
<th>Effects of Different Message Themes/Strategies (for each outcome: main effect of message theme/strategy &amp;/OR moderated effect?)</th>
<th>Effects of Different Executional Characteristics (for each outcome: main effect of executional characteristic &amp;/OR moderated effect?)</th>
<th>Sub-Group Differences (for each individual characteristic x each outcome: significant moderation?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams et al., 2011[57]</td>
<td>Themes/strategies compared: none; Executional characteristics compared: fear-relief emotional tone (n=1); sadness-joy emotional tone (n=1)</td>
<td>Medium: print</td>
<td>Design: forced exposure, with a between-subjects experimental design: 2 (fear-relief vs. sadness-joy) x 2 (prevention self-regulatory focus vs. promotion self-regulatory focus)</td>
<td>attitude towards the ad; intention to quit; intention to think about negative effects of smoking; intention to think about quitting; intention to find out more about methods to quit; ad involvement</td>
<td>N/A</td>
<td>all outcomes: no main effects (+ sig. int.)</td>
</tr>
<tr>
<td>Bresnahan et al., 2013[50]</td>
<td>Themes/strategies compared: self-referring; other-referring (friends)</td>
<td>Medium: text (online)</td>
<td>Design: forced exposure, with a between-subjects experimental design: 2 (gain-frame vs. loss-frame) x 2 (self-referring vs. other-referring), with a no msg. control condition</td>
<td>perceived susceptibility to smoking harms; perceived severity of smoking harms; smoking enjoyment; resistance efficacy; intention to smoke</td>
<td>perceived susceptibility: other-referring &gt; self-referring (int. not tested) all other outcomes: no main effects (int. not tested)</td>
<td>perceived susceptibility; no main effect (+ sig. int.) all other outcomes: no main effects (+ no sig. int.)</td>
</tr>
</tbody>
</table>

Note. *msg. = message/s; > = significantly greater than; < = significantly less than; sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

* Study also included in Appendix A (due to findings assessing the overall effect of the campaign/s).
<table>
<thead>
<tr>
<th>Study</th>
<th>Themes/strategies compared</th>
<th>Executional characteristics compared</th>
<th>Medium</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Analytic sample</th>
<th>Location</th>
<th>GRPs</th>
<th>N/A</th>
<th>Gender</th>
<th>ad ratings</th>
<th>SMQ</th>
<th>Age</th>
<th>Smoking Status</th>
<th>S1</th>
<th>S2</th>
<th>Self-Construal</th>
<th>SMQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carter et al. 2011[56]</td>
<td>none</td>
<td>high-disgust ads rated as more (“Toilet”); n=1) vs. less (“Rubbish”; n=1) amusing &amp; funny</td>
<td>TV, but distributed online</td>
<td>dissemination of ads (via email) tracked via website hits; opt-in survey after ad viewing</td>
<td>single exposure to 1 msg.</td>
<td>N=315 university students (mean age = 22; 14% smokers)</td>
<td>China</td>
<td>unique website hits (ad dissemination); ad ratings (disgusting; revolting; interesting; amusing; anxiety; clever; truthful; funny; misses the point; try hard; dumb; weak; pathetic); believability; smoking intentions</td>
<td>N/A</td>
<td>unique website hits: over 4-months, “Toilet” ad received 487 hits &amp; “Rubbish” ad received 339 hits; “Toilet” &gt; “Rubbish” (int. not able to be tested) ad ratings: no difference between ads, except on amused (“Toilet”) &gt; “Rubbish”) &amp; funny (“Toilet” &gt; “Rubbish”) (+ sig. int.) believability: no difference between ads (+ non-sig. int.) smoking intentions: no difference between ads (+ non-sig. int.)</td>
<td>Gender ad ratings: sig. int. such that for both “Toilet” and “Rubbish”, men were more likely to find the ads amusing and funny and less likely to find them revolting (no differences on any other ratings) Age no sig. int. for any outcomes</td>
<td></td>
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<tr>
<td>Chang, 2009[51]</td>
<td>self-referring (n=1); other-referring (n=1)</td>
<td>none</td>
<td>print (magazine segment, each containing articles, 1 antismoking ad &amp; 2 commercial (filler) ads)</td>
<td>2 forced exposure studies, with between-subjects experimental designs. S1: 2 (self-referring vs. other referring ad) x 2 (independent self-construal vs. interdependent self-construal). S2: 2 (self-referring vs. other referring ad) x 2 (smoker vs. non-smoker)</td>
<td>attitude towards smoking</td>
<td>attitude towards smoking; main effects not tested/reported (+ sig. int.)</td>
<td>N/A</td>
<td>N/A</td>
<td>Self-Construal attitude towards smoking: S1: sig. int. such that self-referring &gt; other-referring ad for independent participants (although non-sig.) and other-referring &gt; self-referring ad for interdependent participants (although non-sig.) Smoking Status attitude towards smoking: S2: sig. int. such that self-</td>
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</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Intensity of exposure</td>
<td>Analytic sample</td>
<td>Indicators of central processing</td>
<td>Indicators of peripheral processing</td>
<td>Likeability</td>
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<tr>
<td>Flynn et al., 2011[52]</td>
<td>forced exposure, with a mixed experimental design: 2 strategies (within: all exposed to all ads) x various individual characteristics</td>
<td>single exposure to 12 ads</td>
<td>N=1771 7th-8th grade students (non-smokers)</td>
<td>both measures: AR &gt; blended &gt; AL (+ sig. int.)</td>
<td>looks cool: blended &gt; AR &gt; AL (+ sig. int.)</td>
<td>AR, blended &gt; AL (+ sig. int.)</td>
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</tbody>
</table>

Note. msg. = message/s; > = significantly greater than; < = significantly less than; sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

* Study also included in Appendix A (due to findings assessing the overall effect of the campaign/s).
<table>
<thead>
<tr>
<th>Goetz, 2011[55]</th>
<th>Themes/strategies compared: none</th>
<th>Executional characteristics compared: fear only (n=5); fear + disgust (n=5) (all about negative health effects)</th>
<th>Design: forced exposure, with a mixed experimental design: 2 (between: fear only vs. fear + disgust) x 5 (within: 5 ads) x 3 (within: baseline; 1st exposure; 2nd exposure), and a 2-week follow-up</th>
<th>N/A</th>
<th>Indicators of peripheral processing: sig. int. for ‘looks cool’, such that H &gt; AA &amp; C for AR ads, but all equivalent for blended &amp; AL ads; sig. int. for ‘fun to watch’, such that H &gt; C for AR ads, but all equivalent for blended &amp; AL ads. <strong>Likeability:</strong> non-sig. int.</th>
</tr>
</thead>
</table>
| **Academic Achievement (A vs. B vs. C/D grades)** | **Indicators of central processing:** sig. int. for ‘has good facts’, such that A & B > C/D for AR ads, B & C/D > A for blended ads, & C/D > A for AL ads; sig. int. for ‘makes me think’, such that A & B > C/D for AR ads, B > C/D for blended ads, all equivalent for AL ads. | **Indicators of peripheral processing:** sig. int. for ‘looks cool’, such that A > C/D for AR ads, B > C/D for blended ads, A & B > C/D for AL ads; non-sig. int. for ‘fun to watch’ | **Likeability:** non-sig. int. | **Smoking Level (low vs. moderate)** | **Fear ratings:** no main effect (+ sig. int.)
**Disgust ratings:** fear + disgust > fear only (+ sig. int.)
**Heart rate:** no main effect (+ no sig. int.)
**Smoking Level (low vs. moderate)** | **Fear ratings:** sig. int. such that fear only > fear + disgust ads for moderate smokers only; moderate smokers > low smokers on fear ratings after fear only ads |

*Note.* msg. = message/s; > = significantly greater than; < = significantly less than; sig. = significant/significantly (typically at $p<.05$); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

*Study also included in Appendix A (due to findings assessing the overall effect of the campaign/s).
<table>
<thead>
<tr>
<th>Medium: TV</th>
<th>Intensity of exposure: 2 exposures to 5 ads</th>
<th>quit; quit attempts at follow-up</th>
<th>tonic skin conductance change: fear only &gt; fear + disgust (+ no sig. int.)</th>
<th>disgust ratings: sig. int. such that fear + disgust &gt; fear only ads for low smokers; moderate smokers &gt; low smokers on disgust ratings after fear only ads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytic sample: 18-25 year old university students (current smokers). N=81, except N=61 for physiological data &amp; N=73 at follow-up</td>
<td>skin conductance response: no main effect (+ no sig. int.)</td>
<td>blood pressure change: fear only &gt; fear + disgust for diastolic blood pressure; no main effect for systolic blood pressure (+ no sig. int.)</td>
<td>recall/thinking about ads/discussing the ads at follow-up: no main effects (+ no sig. int.)</td>
<td></td>
</tr>
<tr>
<td>Location: US</td>
<td>recall/thinking about ads/discussing the ads at follow-up: no main effects (+ no sig. int.)</td>
<td>readiness to quit: no main effect (+ no sig. int.)</td>
<td>quit attempts at follow-up: no main effect (+ no sig. int.)</td>
<td></td>
</tr>
</tbody>
</table>

Kelly et al., 2010[46]  
Themes/strategies compared: health effects (NHE; n=2); social norms (SN; n=2); anti-tobacco industry (ATI; n=2)  
Executional characteristics compared: English; Spanish; Spanglish language  
Medium: print  
Design: forced exposure, with a mixed experimental design: 3 themes (within: all exposed to all 6 messages) x 3 (between: English vs. Spanish vs. Spanglish)  
Intensity of exposure: single exposure to 6 ads  
Analytic sample: N=277 bilingual Mexican-American 9th & 10th students (35% ever smokers)  
ad appeal; believability; ad-attributable smoking deterrence; readability  
ad appeal: main effects not tested/reported (+ sig. int.)  
believability: main effects not tested/reported (+ sig. int.)  
smoking deterrence: main effects not tested/reported (+ sig. int.)  
readability: main effects not tested/reported (+ int. not tested)  
Smoking Status  
ad appeal: sig. int. such that for non-smokers, ATI ads most appealing; for smokers, NHE ads most appealing & appeal of ATI & SN ads decreased with heavier smoking  
believability: sig. int. such that for non-smokers, NHE ads most believable & SN ads least believable; for smokers, NHE ads most believable & ATI ads least believable  

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<table>
<thead>
<tr>
<th>Kuang, 2009 [47]</th>
<th>Location: US</th>
<th>smoking deterrence: sig. int. such that for non-smokers, ATI ads most deterrent; for smokers, NHE ads most deterrent. smoking deterrence: no sig. int. for msg. theme; sig. int. for language condition such that as acculturation increased, readability decreased for the Spanish condition.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Themes/strategies compared: health effects (NHE; n=2); secondhand smoke consequences (SHS; n=2); social disapproval risk (SN; n=2)</td>
<td>Design: forced exposure, with a between-subjects experimental design: 3 msg. (NHE vs. SHS vs. SN) &amp; 1 control condition (exposed only to filler ads only).</td>
<td>intention to smoke: campaign-targeted beliefs and attitudes towards smoking</td>
</tr>
<tr>
<td>Executional characteristics compared: none</td>
<td>Intensity of exposure: single exposure to 2 ads (in treatment conditions)</td>
<td>all outcomes: no main effects (+ int. not tested, although effect of self-construal [interdependent vs. independent] examined within condition)</td>
</tr>
<tr>
<td>Medium: print (advertising booklet, each containing 2 antismoking)</td>
<td>Analytic sample: N=362 12-14 year old 7th grade students (non-smokers)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Study</th>
<th>Themes/strategies compared</th>
<th>Executional characteristics compared</th>
<th>Medium</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Analytic sample</th>
<th>Location</th>
<th>N/A</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Langleben et al., 2009[58]</td>
<td>none</td>
<td>high msg. sensation value (MSV)</td>
<td>TV</td>
<td>forced exposure (all exposed to all ads)</td>
<td>single exposure to 16 ads</td>
<td>N=18 18-48 year olds (mean age = 23 years; regular smokers)</td>
<td>China</td>
<td>recognition accuracy; recognition response time (recognition of frames from ads)</td>
<td>N/A</td>
</tr>
<tr>
<td>Leshner et al., 2009[54]</td>
<td>none</td>
<td>low fear/low disgust (n=6); low fear/high disgust (n=6); high fear/high disgust (n=6); high fear/low disgust (n=6)</td>
<td>TV</td>
<td>forced exposure, with a within-subjects experimental design: 2 (fear: low/high) x 2 (disgust: low/high)</td>
<td>single exposure to 24 ads</td>
<td>N=58 university students (&gt;18 years old; non-smokers) (N=54 for attention analyses &amp; N=55 for recognition analyses, due to missing data)</td>
<td>US</td>
<td>attention (measured by decelerating heart rate); recognition accuracy; recognition sensitivity; recognition confidence</td>
<td>N/A</td>
</tr>
<tr>
<td>Leshner et al., 2009[48]</td>
<td>health effects (NHE); social consequences (SC)</td>
<td></td>
<td>TV</td>
<td>forced exposure, with a mixed experimental design: 2 (within: gain vs. loss frame) x 2 (within: NHE)</td>
<td></td>
<td></td>
<td>US</td>
<td>cognitive processing (secondary-task reaction time); recognition accuracy</td>
<td>See next column</td>
</tr>
</tbody>
</table>

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<th>Themes/strategies compared</th>
<th>Executional characteristics compared</th>
<th>Medium</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Analytic sample</th>
<th>Intensity of outcome extremity</th>
<th>Recognition accuracy</th>
<th>Main effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murphy-Hoefler et al., 2008; 2010 [41, 42]</td>
<td>health effects (NHE; n=4); social norms (SN; n=4); anti-tobacco industry (ATI; n=4)</td>
<td>gain frame; loss frame high outcome extremity; low outcome extremity</td>
<td>TV</td>
<td>forced exposure, with a mixed experimental design: 3 x 2 (between: NHE vs. SN vs. ATI) x 4 (within: humor vs. sarcasm vs. testimonial vs. drama)</td>
<td>2 exposures to 4 ads</td>
<td>N=1020 18-24 year old university students (36% current smokers)</td>
<td>health effects beliefs; social norms beliefs; anti-tobacco industry beliefs; perceived effectiveness; intention to quit (change in those with no intention at pre-exposure)</td>
<td>sig. int. between frame x outcome extremity, such that extreme loss-framed messages were best recognized; main effect of outcome extremity, extreme &gt; not extreme; no other main effects or sig. int.</td>
<td>None examined</td>
</tr>
<tr>
<td>Pechmann et al., 2010[53]</td>
<td>attractiveness &amp; prevalence &amp; disapproval of smoking (A-P-D; n=1); attractiveness &amp; prevalence of smoking (A-P; n=1)</td>
<td>forced exposure, with between-subjects experimental design: 3 (A-P-D vs. A-P vs. control; C, no smoking content) x 2 (nonsmoker vs. smoker)</td>
<td>TV</td>
<td>recall of smoking content; perceived anti-smoking tone; disapproval thoughts; disapproval beliefs; attractiveness beliefs; prevalence belief</td>
<td>recall of smoking content: A-P-D &gt; A-P &gt; C (+ sig. int.)</td>
<td>N/A</td>
<td>Smoking Status recall of smoking content: sig. int. such that A-P-D &gt; A-P for nonsmokers but not for smokers disapproval thoughts: sig. int. such that A-P-D &gt; A-P &gt; C effect stronger for</td>
<td>None examined</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Study 1</th>
<th>Executional characteristics compared: none</th>
<th>Medium: edited TV program segment</th>
<th>single exposure to 11-minute TV program segment</th>
<th>Analytic sample: N=1046 14-15 year old 9th grade students</th>
<th>Location: US</th>
<th>disapproval thoughts: A-P-D &gt; A-P &gt; C (+ sig. int.)</th>
<th>disapproval belief: A-P-D &gt; A-P, C (+ no sig. int.)</th>
<th>attractiveness belief: A-P &gt; A-P-D, C (+ no sig. int.)</th>
<th>prevalence belief: no effect (+ no sig. int.)</th>
<th>nonsmokers than smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 2</td>
<td>Themes/strategies compared: attractiveness, prevalence &amp; disapproval of smoking (A-P-D; n=1); attractiveness, prevalence, disapproval &amp; approval of smoking (A-P-D-A; n=1)</td>
<td>Executional characteristics compared: epilogue; no epilogue</td>
<td>Design: forced exposure, with between-subjects experimental design: 3 (A-P-D vs. A-P-D-A vs. C) x 2 (epilogue vs. no epilogue) x 2 (nonsmoker vs. smoker)</td>
<td>Intensity of exposure: single exposure to 11-minute TV program segment</td>
<td>Analytic sample: N=1804 14-13 year old 9th grade students</td>
<td>Location: US</td>
<td>recall of smoking content: A-P-D &gt; A-P-D-A &gt; C (+ no sig. int.)</td>
<td>perceived anti-smoking tone: A-P-D &gt; A-P-D-A &gt; C (+ sig. int.)</td>
<td>disapproval thoughts: A-P-D &gt; A-P-D-A &gt; C (+ no sig. int.)</td>
<td>recall of smoking content: no main effect (+ no sig. int.)</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Study</th>
<th>Themes/strategies compared</th>
<th>Exceptional characteristics compared</th>
<th>Medium</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Analytic sample</th>
<th>Location</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samu et al., 2008[45]</td>
<td>See below</td>
<td>high fear health effects ads (n=2); low fear anti-tobacco industry (n=2) ads</td>
<td>online print ads</td>
<td>2 forced exposure studies, with between-subjects experimental designs. S1: 2 (high vs. low fear) x 2 (male vs. female). S2: 2 (high vs. low fear) x 2 (male vs. female) x 2 (imagined discussion about ad with friend vs. imagined discussion about ad with stranger)</td>
<td>single exposure to 2 ads</td>
<td>N=102 university students (92% &lt;25 years old; 73% non-smokers). S2: N=114 university students (72% nonsmokers)</td>
<td>not reported</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>propensity to smoke; attitude towards smoking; belief about acceptability of smoking; susceptibility to antismoking ads</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>propensity to smoke: S1 &amp; S2: no main effects (+ sig. int. in S2) attitude towards smoking: S1 &amp; S2: no main effects (+ no sig. int.) belief about acceptability of smoking: S1: high fear &lt; low fear (+ no sig. int.); S2: no main effects (+ sig. int.) susceptibility to antismoking ads: S1 &amp; S2: no main effects (+ sig. int. in S2) (+ sig. int. with discussion partner in S2, such that higher susceptibility when imagined discussing the ad with friends than with strangers in high fear condition, but no difference in low fear condition)</td>
</tr>
<tr>
<td>Shadel et al., 2009[43]</td>
<td>See below</td>
<td>low actor appeal; high actor appeal</td>
<td>TV</td>
<td>forced exposure, with a mixed experimental design: 2 (within: low actor appeal vs. high actor appeal) x 3 (within: STHE vs. LTHE vs. ATI) x 2 (between: low smoking risk vs. high smoking risk), with 2-5 ads per condition</td>
<td>single exposure to 21 ads</td>
<td></td>
<td></td>
<td>self-efficacy to resist smoking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>self-efficacy: no main effect</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Study</th>
<th>Themes/strategies compared</th>
<th>Executional characteristics compared</th>
<th>Medium</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Outcome measures</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shadel et al., 2010[59]</td>
<td>None</td>
<td>implicit (n=8) vs. explicit (n=3) delivery of anti-tobacco industry msg.</td>
<td>TV</td>
<td>forced exposure, with a mixed experimental design: 2 (within: implicit msg. vs. explicit msg.) x 2 (between: younger vs. older)</td>
<td>single exposure to 3 or 8 ads (depending on condition)</td>
<td>self-efficacy to resist smoking</td>
<td>N/A</td>
</tr>
<tr>
<td>Terry-McElrath et al., 2013[12]</td>
<td>anti-tobacco ads; pharmaceutical ads; tobacco industry ads (all ads that aired 2001-2008)</td>
<td>none</td>
<td>TV</td>
<td>longitudinal design using Monitoring the Future 2 year follow-up data (2001-2008); measures of GRPs assigned to participants based on the media market they lived in &amp; the date of the follow-up survey; (1) cumulative GRPs over the 24 months prior to survey for the 3 type of ads; (2) a quadratic term for cumulative GRPs; (3) categorical version of cumulative GRPs (52 ad exposure [5200 GRPs] increments)</td>
<td>mean 2-year exposure to 5 measures of 2-year smoking behavior change: uptake; daily smoking uptake; quitting among all smokers; quitting among daily smokers; reduction or quitting among daily smokers</td>
<td>intake: no effect of linear or quadratic GRPs for all 3 types of ads daily smoking uptake: no effect of linear or quadratic GRPs for all 3 types of ads quitting among all smokers: no effect of linear GRPs for all 3 types of ads; effect of quadratic GRPs among daily smokers and effect of quadratic &amp; categorical GRPs among all smokers for anti-tobacco ads only, such that exposure to 10,400-15,500 GRPs over 24-months was associated with more quitting than</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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anti-tobacco ads in the population was 13,900 GRPs, mean exposure to pharmaceutical ads was 22,100 GRPs, & mean exposure to tobacco industry ads was 15,500 GRPs.  
**Analytic sample:** N=26,315 observations from 12,931 20-30 year olds, recruited as high school seniors. Eligible participants provided baseline data while at high school, & follow-up data at 2-yearly intervals (at least 1 round of follow-up data to be eligible), & reported residing in the same state for the 24-month period prior to the current survey.  
**Location:** US  
**N/A**  
<table>
<thead>
<tr>
<th>Study</th>
<th>Themes/strategies compared: negative health effects (NHE; n=2 text &amp; n=6 TV); short-term effects (STE; n=1 text &amp; n=4 TV); secondhand smoke (SHS; n=1 text &amp; n=3 TV); addiction (A; n=1 text &amp; n=4 TV); anti-tobacco industry (ATI; n=1 text &amp; n=11 TV)</th>
<th>Design: forced exposure, with data collected at 2 time points (2 weeks apart). At Time 1, exposure to decontextualized print messages, mixed experimental design: 5 (within: NHE vs. STE vs. SHS vs. A vs. ATI) x 2 (between: European-American vs. African-American). At Time 2, exposure to TV PSAs, mixed experimental design: 5 (within: NHE vs. STE vs. SHS vs. A vs. ATI) x 2 (between: European-American vs. European-American)</th>
<th>N/A</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tharp-Taylor et al., 2012[44]</td>
<td><strong>perceived msg. strength:</strong> main effects not reported (+ sig. int.)</td>
<td><strong>perceived msg. strength:</strong> main effects not reported (+ sig. int.)</td>
<td><strong>Race/Ethnicity</strong></td>
<td><strong>perceived msg. strength:</strong> sig. int. such that NHE messages were rated as more persuasive by European-Americans than African-Americans, but no difference in ratings of other messages. For European-Americans, NHE &gt; SHS &gt; STE; A, ATI. For African-Americans, NHE &gt; A &amp; ATI.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>self-efficacy:</strong> NHE &gt; all others; ATI &lt; all others (+ no sig. int.)</td>
<td><strong>self-efficacy:</strong> NHE &gt; all others; ATI &lt; all others (+ no sig. int.)</td>
<td></td>
<td><strong>perceived msg. strength:</strong></td>
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<tr>
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<th>Themes/strategies compared</th>
<th>Design</th>
<th>Intensity of exposure</th>
<th>Analytic sample</th>
<th>Location</th>
<th>perceived effectiveness</th>
<th>all outcomes</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vardavas et al., 2010[40]</td>
<td>negative health effects (NHE; n=3); secondhand smoke (SHS; n=2); social norms (SN; n=1); anti-tobacco industry (ATI; n=1)</td>
<td>forced exposure (all exposed to all ads)</td>
<td>2 exposures to 7 ads</td>
<td>N=95</td>
<td>Greece</td>
<td></td>
<td>all outcomes</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None examined</td>
</tr>
<tr>
<td>Veer et al., 2008[49]</td>
<td>negative health effects (NHE; n=1); addiction (A; n=1)</td>
<td>forced exposure, with a between-subjects experimental design: 2 (NHE vs. A) x 3 (stage-of-change: precontemplation (PC) vs. contemplation (C) vs. preparation (PP))</td>
<td>single exposure to 1 ad</td>
<td>N=200</td>
<td>UK</td>
<td>attitude towards quitting</td>
<td>attitude towards quitting; main effects not reported (+ sig. int.)</td>
<td>N/A</td>
</tr>
<tr>
<td>Vogeltanz-Holm et al., 2009[39]</td>
<td>negative health effects (NHE; n=3)</td>
<td>cross-sectional survey</td>
<td>confirmed recall; perceived effectiveness (for ads recalled)</td>
<td>TV ads: “Artery” (NHE) &gt; “Bucking Bronco”</td>
<td>N/A</td>
<td>Gender perceived effectiveness:</td>
<td></td>
<td>Stage-of-Change</td>
</tr>
</tbody>
</table>

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<th>Executional characteristics compared</th>
<th>Medium</th>
<th>Intensity of exposure</th>
<th>msg. acceptance; perceived effectiveness; feeling of discomfort; likelihood of discussing ad</th>
<th>msg. acceptance</th>
<th>Perceived effectiveness</th>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Combined Sample: G-NHE ads all &gt; T-NHE; no difference between S-NHE &amp; T-NHE; By Country: G-NHE ads &gt; S-NHE ad in 6 of 10 &amp; &gt; T-NHE ad in 6 of 10 countries</td>
<td></td>
<td></td>
<td>int. not sig. for confirmed recall and not tested for perceived effectiveness due to small Ns</td>
</tr>
<tr>
<td>Wakefield et al., 2013[60]</td>
<td></td>
<td></td>
<td>TV &amp; n=3 radio; social norms (SN; n=1 TV); anti-tobacco industry (ATI; n=1 TV &amp; n=1 radio); cosmetic effects (CE; n=1 radio)</td>
<td>Intensity of exposure: 12,690 TRPs for all TV ads, over 13 weeks (= ~2540 TRPs per ad), 3730 total airings for all radio ads, over 13 weeks (= ~746 total airings per ad); Confirmed recall ranged between 8% - 42% for TV ads &amp; 3% - 35% for radio ads</td>
<td>Articulate difference: White or American Indian 12-17 year olds (23% ever smokers)</td>
<td>Radio ads: “ABC” (NHE) &gt; “Napkin” (NHE); “Thank You” (ATI), “Wanna Come Over” (CE) &gt; “Joe DoBoer” (NHE) (+ no sig. int.)</td>
<td>Race/Ethnicity</td>
<td></td>
</tr>
</tbody>
</table>

Note. msg. = message/s; > = significantly greater than; < = significantly less than; sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

* Study also included in Appendix A (due to findings assessing the overall effect of the campaign/s).
NHE:
By Country: G-NHE ads > S-NHE ad in 8 of 10 & > T-NHE ad in 7 of 10 countries

discuss: Combined
Sample: G-NHE ads & S-NHE all > T-NHE:
By Country: G-NHE ads > S-NHE ad in 7 of 10 & > T-NHE ad in 8 of 10 countries

Note. msg. = message/s; > = significantly greater than; < = significantly less than; sig. = significant/significantly (typically at p<.05); int. = interaction/s; TRPs = targeted rating points and GRPs = gross rating points (measures are used by the advertising industry to estimate the number of people who were potentially exposed to an advertisement, capturing both the reach and frequency of campaign exposure); N/A = category not applicable to that study/campaign.

* Study also included in Appendix A (due to findings assessing the overall effect of the campaign/s).