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Promising Themes for Antismoking Campaigns Targeting Youth and Young Adults

Emily Brennan, PhD,
David Hill Research Fellow, Centre for Behavioural Research in Cancer, Cancer Council Victoria, Melbourne, Victoria, Australia

Laura A. Gibson, PhD,
Research Director, Tobacco Center of Regulatory Science, Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA

Ani Kybert-Momjian, BA,
Research Coordinator, Tobacco Center of Regulatory Science, Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA

Jiaying Liu, MA, and
Doctoral Student, Tobacco Center of Regulatory Science, Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA

Robert C. Hornik, PhD
Wilbur Schramm Professor of Communication and Health Policy, Tobacco Center of Regulatory Science, Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA

Abstract

Objectives—Behavior change campaigns typically try to change beliefs that influence behaviors, with targeted beliefs comprising the campaign theme. We present an empirical approach for choosing among a large number of potential themes, and results from the implementation of this approach for campaigns aimed at 4 behavioral targets: (1) preventing smoking initiation among youth, and (2) preventing initiation, (3) stopping progression to daily smoking and (4) encouraging cessation among young adults.

Methods—An online survey of 13- to 17-year-olds and 18- to 25-year-olds in the United States (US), in which 20 potential campaign themes were represented by 154 beliefs. For each behavioral target, themes were ranked based on the strength of belief-intention and belief-behavior associations and size of the population not already endorsing the beliefs.

Correspondence Dr Brennan; emily.brennan@cancervic.org.au.

Human Subjects Statement
The University of Pennsylvania's Institutional Review Board approved this study (Protocol #816389, #816442 and #816672).

Conflict of Interest Statement
All authors of this article declare they have no conflicts of interest.

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Results—The most promising themes varied across behavioral targets but 3 were consistently promising: consequences of smoking for mood, social acceptance and social popularity.

Conclusions—Using a robust and systematic approach, this study provides campaign developers with empirical data to inform their selection of promising themes. Findings related to the campaign to prevent initiation among youth informed the development of the US Food and Drug Administration's "The Real Cost" campaign.

Keywords

campaign development; communication campaigns; smoking prevention; tobacco use; youth

Mass media campaigns have been shown to reduce tobacco use among youth and young adults,[1–6] and these campaigns form a pivotal component of comprehensive tobacco control programs around the world.[7,8] Campaign developers face several important decisions when designing campaigns to reduce tobacco use. In addition to selecting the target behavior (eg, initiation vs cessation), target audience (eg, never vs current smokers; youths vs adults) and the channels through which the campaign will be delivered (eg, television, social media), they must also decide what the campaign will be about; that is, the cam paign theme. For example, previous campaigns targeted at youth and young adults have used themes ranging from social disapproval of smoking to the negative health consequences of tobacco and the deceptive practices of the tobacco industry.[1,2,4,5] Campaign theme selection may be guided by the experience and insight of campaign funders and developers, literature reviews, qualitative research, or quantitative surveys with representative samples of the target audience.[9–19] In the current study, we analyzed quantitative survey data to provide campaign planners with an objective, robust, and empirical basis for choosing among the large and diverse set of potential themes for campaigns to reduce smoking among youth and young adults.

Underpinning this approach are traditional theories of behavioral prediction, such as the Theory of Reasoned Action.[20] According to these theories, behaviors are causally preceded by intentions to perform the behavior, which in turn, are causally preceded by attitudinal, normative and efficacy beliefs about the behavior. Therefore, campaigns to change behaviors should try to change the beliefs that predict whether or not individuals hold the relevant intentions, and so it is the beliefs to be changed that underlie the message strategy, or the theme of the campaign.[11] Drawing on that general theoretical approach, Hornik and Woolf[12] identified specific criteria that when applied to quantitative survey data, help to identify the most and least promising beliefs to be targeted by a campaign. First, the belief should be strongly associated with the targeted intention or behavior. Second, it should not already be endorsed by too high a proportion of the population, such that there are some people available to be affected by the message. Hornik and Woolf also recommended assessing the feasibility of changing a given belief with a campaign message, but this third criterion requires a subjective judgment and cannot be answered using survey data alone.[12,17]

We applied the Hornik and Woolf criteria to assess the relative promise of themes for campaigns to reduce smoking among youth and young adults in the United States (US). We assessed the promise of 20 potential campaign themes using cross-sectional survey data

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from a large and heterogeneous sample. The use of cross-sectional survey data to compare systematically the relative promise of a large number of potential campaign themes is one of the most efficient methods available to researchers and campaign planners who work in applied settings, and is particularly useful when there is a large number of themes from which to choose, or when little is known about the association of potential themes with behavior. Although experimental studies that compare responses of participants exposed to messages addressing one or the other of a set of potential themes might provide stronger causal evidence that some themes are more likely than others to lead to positive changes in behavior, such an approach is greatly limited in the feasibility of testing many potential themes. Experimental studies are resource intensive because they require mock-ups of ads; therefore, they are more valuable later in the process of message development. In practice, the 2 approaches usually comprise 2 phases of formative evaluation: (1) cross-sectional data sorts through a large set of potential themes to identify those that are most promising; and then (2) an experimental study is used to test the materialized messages developed to address the promising themes.[17]

In this study, we also systematically examined whether theme promise varied according to respondent characteristics. It is argued often that health promotion messages should be targeted at specific segments of the target audience,[11,21,22] both as a means of increasing persuasive effects on individuals and of addressing disparities that exist for various health conditions.[22] For instance, in the US there are well-established race- and ethnicity-based disparities in experiences of smoking-related illnesses.[23,24] Communication campaigns can attempt to address these disparities in 2 different ways: (1) by creating versions of the campaign that are targeted to different audience sub-groups either in terms of the message themes used, the channels selected, or the execution of these messages (the “differentiation” approach); or (2) by striving to develop a campaign that is likely to reach and have a positive impact on all audience sub-groups (ie, the “common denominator” approach).[22] At the individual-level, differentiated—or segmented—campaigns always will be more effective for targeted individuals than non-segmented campaigns. But at the population-level, and in the context of scarce resources for health communication campaigns, it is likely that a common denominator campaign will provide a far more cost-effective approach.[22] Importantly, one recent study provided evidence consistent with the common denominator approach, by identifying 8 potential campaign themes that would be expected to have a positive impact across sex and race/ethnicity sub-groups, if used in a campaign to encourage adult smokers to quit.[25] Conscious of this evidence, and of the increasingly tight funding environment faced by campaign developers, in the current study we emphasize the common denominator approach to choosing potential campaign themes. Our primary goal was to identify themes that had the potential to work for most or all segments of the target audience, while still documenting those themes that may be more or less effective among particular sub-groups.

In the current study, we evaluated the relative promise of each theme in achieving 4 potential campaign goals. The first campaign goal would be to prevent smoking initiation in the general population of youth (13- to 17-year-olds), and the second would be to prevent initiation in the general population of young adults (18- to 25-year-olds). The third campaign goal would be to stop progression to daily smoking among those 18- to 25-year-olds who were currently smoking but not every day, consistent with evidence that many smokers

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transition to daily smoking during young adulthood.[26] The fourth campaign would encourage cessation among established (ie, smoked 100 or more cigarettes in lifetime) 18- to 25-year-old current smokers. Although our primary aim was to identify the most and least promising themes for each of the 4 specific campaigns, we also looked for consistency in findings across the campaigns. If the same themes could be used to target multiple audiences and behaviors, then campaign developers would be able to direct more of their resources into creating a more unified campaign presence and achieving greater reach within the population.

METHODS

Sample and Procedure

Data were collected in 2012 using online surveys that took about 12 minutes to complete. Respondents were excluded from the analytic sample if they took more than one hour or less than half the median time, or if they had missing data on more than 10% of the items (6% of 13- to 17-year-olds and 8% of 18- to 25-year-olds).

We recruited 13- to 17-year-olds from 2 sources: (1) the online panel developed by Survey Sampling International[27] (SSI; valid data from N = 805) and (2) GfK's KnowledgePanel®[28] (valid data from N = 388). SSI's panel is comprised of individuals aged 18 and above who voluntarily opt-in to be a member of the panel and receive small financial incentives for completing surveys. The 13- to 17-year-olds who participated in this study were recruited through an adult panel member who lived in their household. Whereas the SSI panel comprises more than one million individuals who vary widely in their characteristics, it cannot be considered a representative sample of the US population. By comparison, GfK's KnowledgePanel was, at that time, the only Internet panel that sought a probability sample, employing addressed-based sampling for the recruitment and maintenance of its panel, and intending to be representative of the US population. GfK maintains a panel of 13- to 17-year-olds as well as an adult panel, and for the current study, individuals were recruited from both. Regardless of which panel they were recruited from (SSI adult panel, GfK teen panel, GfK adult panel), an adult panel member was the first point of contact for all respondents. Respondents from the SSI and GfK samples were combined into a composite sample, which was then weighted to be representative of the US population of 13- to 17-year-olds in terms of sex, age, race/ethnicity, and the proportion living in metro and non-metro areas.

The 18- to 25-year-olds were recruited only through SSI (valid data from N = 3031). Quotas were used to recruit never smokers, former smokers, not daily smokers, and daily smokers in proportion to their numbers in the 2010 National Survey on Drug Use and Health,[29] and then data were weighted to match the 2011 National Survey on Drug Use and Health[30] distributions of sex, age, race/ethnicity, education, and metropolitan living status within each smoking behavior sub-group.

Previous applications of the Hornik and Woolf method[17,31] have relied on behavioral intentions as the outcome against which the promise of potential themes was assessed. We built on this previous work by assessing the strength of both belief-intention and belief-behavior associations. In the intention analyses, we restricted the sample to those not

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currently engaged in the targeted behavior and then assessed the strength of association between each belief and intentions to engage in the behavior. In the behavior analyses, we assessed the strength of association between each belief and current behavioral status (ie, engaged in the behavior vs not engaged in the behavior; similar to a Doer/Non-doer analysis[32]). Conducting both types of analyses allowed us to abate the limitations associated with each. Behavior is the outcome we are most interested in, and intentions predict behavior only imprecisely. On the other hand, cross-sectional associations between current beliefs and reports of past behavior are uncertain evidence for beliefs *leading* to the behavior. Associations between current beliefs and intentions to perform a behavior in the future are less vulnerable to this concern. By using both intentions and behavior as outcomes we seek to balance (but not eliminate) these countervailing concerns.

To identify the appropriate sample for use in the intention and behavior analyses for the 4 campaigns, we measured the frequency of use of cigarettes, other forms of smoked tobacco, and smokeless tobacco. Table 1 defines each analytic sample.

Measures

Behaviors and intentions—Table 1 also identifies which of these behavior questions were used as outcome measures in the behavior analyses, and which of 5 questions measuring future intentions to use tobacco formed the outcome for each set of intention analyses.

Potential campaign themes and campaign messages—To identify the set of potential campaign themes to be measured, we relied on reviews summarizing evidence regarding the predictors of youth smoking (in particular, the 2012 Surgeon General's Report[2]) and studies evaluating the effectiveness of tobacco control communication campaigns. The process used to extract potential campaign themes from this literature, and the detailed findings from this process, are presented in 2 working papers.[33,34] But briefly, from a systematic assessment of this literature we generated a list of more than 80 factors associated with youth smoking behaviors (risk factors and protective factors).[34] From this list, we then identified 20 factors that could feasibly be targeted by a tobacco control communication campaign that would address young people as the direct target audience. Non-shortlisted factors included those for which a communication campaign would need to address an audience other than young people (eg, clean indoor air laws are a protective factor, but require a campaign targeting policymakers), or a behavior other than tobacco use (eg, alcohol use is a risk factor, but requires a campaign addressing alcohol use), or that would not be amenable to being changed by a communication campaign (eg, the personality trait of sensation seeking is a risk factor, but cannot feasibly be changed through communication interventions).[33,34] Shortlisted factors included perceptions around smoking cigarettes such as self-effnicacy to stop smoking,[35] peer pressure to smoke, beliefs about the consequences of smoking (eg, mood effects; cosmetic effects), and beliefs about the consequences of not smoking (eg, compliance with non-smoking social norms). These 20 shortlisted factors became the potential campaign themes. Tables 3–6 provide the full list of themes.

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For each theme, we then generated a set of survey items to measure specific beliefs related to the overall theme. For example, for the Physical (Cosmetic) Effects theme, we generated 10 items specifying some of the different cosmetic effects associated with smoking, such as "get yellow fingers" and "get wrinkles." Survey items were drawn from a large number of past studies that had measured smoking-related beliefs and/or had evaluated anti-smoking campaigns. In generating the set of specific belief items for each theme we aimed to strike a balance between providing a thorough assessment of each theme (some of which encompassed a greater diversity of dimensions or sub-concepts and thus included a larger number of beliefs compared to others, eg, Physical [Health] Effects), while also constraining the overall number of survey items.

Overall, the 20 potential campaign themes were represented in the survey by 154 individual belief items. Of the 20 themes, 14 were related to consequences of smoking and in the survey, these themes were measured using 132 individual beliefs (each theme was measured by at least 2 and up to 31 beliefs). These survey items began with the introductory stem "If I smoke every day, I will…" and were measured using a 5-point scale, *very unlikely – very likely*, which for analyses, was dichotomized at the point representing the strongest antismoking belief (eg, "very likely" or "very unlikely" as appropriate). Each respondent received just half of these items, randomly selected and ordered. An additional 3 themes were related to consequences of *not smoking* and in the survey; these themes were measured using 15 individual beliefs (between 2 and 10 beliefs per theme). These survey items began with the introductory stem "If I do not smoke at all, I will…" and were also measured using the *very unlikely – very likely* scale (dichotomized at "very likely") (in Tables 3–6, the labels for these themes include the words "Not Smoking"). Each respondent received just half of these items, randomly selected and ordered. Finally, an additional 3 themes were measured in slightly different ways, and were asked of all respondents. First, the Peer Pressure from Others theme was represented in the survey by 2 items introduced with the stem "How often…" (eg, …do others your age encourage you to smoke?) and measured on a *never – almost always* 5-point scale (dichotomized at "never"). Second, the Self-Efficacy theme was represented by 3 items introduced with the stem "How sure are you that, if you really wanted to, you could say no to a cigarette offer if …" (eg, …a very close friend offers it?) and measured on a *not at all sure – completely sure* 5-point scale (dichotomized at "completely sure"). Third, the Youth Susceptibility to Health Effects theme was represented by 1 item measured in the same way as the other consequences of smoking ("If I smoke every day, I would be just as likely to damage my body as an adult smoker would") plus 2 items introduced with the stem "Do you agree or disagree with the following statements…" (eg, …people my age who smoke every day are just as likely to harm their health as older people who smoke every day) and measured on a *strongly disagree – strongly agree* 5-point scale (dichotomized at "strongly agree"). All of the individual beliefs measured for each theme are detailed in Tables B1, C1, D1 and E1 in the *online* supplementary material.

We used principal components factor analysis to confirm that the set of individual belief items intended to measure each theme represented the same underlying construct. These analyses identified 10 beliefs that did not load with the other items in their predicted themes. These 10 items were excluded for the purposes of analysis and reporting, leaving the 154 individual beliefs described above (ie, the survey actually contained 164 individual beliefs).

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For each theme, we then created a scale by averaging together the original 5-point responses for the individual belief items representing that theme; where necessary, items were reverse coded so that a score of 5 corresponded to the strongest antismoking belief for all items, and hence, all scales. Scale Cronbach alphas ranged between .77 and .97 (for 2-item scales, simple correlations ranged between .66 and .72). Scales were dichotomized to compare respondents who did (average score greater than 4.0 on the 1–5 scale) and did not (4.0 or less) hold strong antismoking beliefs.

Our primary focus was on results from analyses using these scales, which are comprised of sets of beliefs representing a common topic domain (eg, health effects) and so most closely align with the notion of an overall campaign theme. However, we also conducted all analyses using the 154 individual belief items, which represent potential belief content for specific campaign messages (eg, smoking causes lung cancer).

Audience characteristics—Respondents reported their sex, age, race/ethnicity, and highest level of education achieved. A 4-item scale measured sensation seeking (adapted from Hoyle et al[36]). Zip codes identified respondents living in metropolitan areas (used for weighting). Characteristics of the analytic samples are presented in Table A1 in the *online* supplementary material.

Data Analysis

All analyses were conducted in Stata 13.0,[37] adjusting for the effects of sample weighting. We calculated 3 quantitative indicators of campaign theme (ie, using scales) and campaign message (ie, using individual beliefs) promise. The first indicator is a measure of the strength of association (odds ratios) between each scale/belief and the outcome variable, obtained via logistic regression analyses. The second indicator is the *potential percentage to move*, which is the proportion of the population that does not already hold the desired belief/s, and therefore, are available to be influenced by the campaign.[12,17] The third indicator is a summary metric called *potential percentage to gain*, which takes into consideration both the first and second indicators. Potential percentage to gain represents the estimated additional proportion of the population who would hold the intention or would engage in the behavior, if 100% of the population endorsed the target belief/s and the target belief/s were perfectly influential.[12,17] Using one individual belief as an example, Table 2 illustrates the calculation of the potential percentage to move and percentage to gain values, based on a cross-tabulation between the belief and intentions. In general, the higher the percentage to gain, the more promising the theme/message is, and higher odds ratios and percentages to move will lead to higher percentages to gain. Given that the percentage to gain captures the information provided by both the odds ratio and percentages to move, we gave primary consideration to these values when determining the relative promise of each theme (scale) and message (belief). Nonetheless, we recommend that campaign planners also look at the belief-outcome association and percentage to move metrics and think carefully before choosing themes. For example, a high percentage to move score might either indicate that it is difficult to persuade people of the belief/s, or that the belief/s provide new information; both situations might yield the same relative promise ranking (depending on the strength of the belief-outcome association), but have different practical implications

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(ie, only in the latter scenario would it be valuable to focus on that belief). In general, we recommend addressing beliefs with a moderate percentage to move as this represents a situation in which people are clearly persuadable, but there are still some that need to be convinced.

Given that the percentage to gain measures varied in magnitude across behavioral targets, we rescaled these numbers to a relative promise index (RPI) to permit easy comparison both within and between targets. The observed mean percentage to gain value (within behavioral target) was assigned a 50 on this index. Zero represents values 3 standard deviations (SD) below the mean; 33 is one SD below the mean; 67 is one SD above the mean; and 100 is 3 SDs above the mean. We then used the RPI to identify themes that were more (≥ 67) or less (≤ 33) promising than others. For those 2 behavioral targets for which we conducted an intention and behavior analysis (Table 1), we averaged the standardized percentage to gain values.

We report percentage to gain results unadjusted for potential confounders. Sensitivity analyses led us to the conclusion that inclusion of measured confounders (age, sex, race/ethnicity, education and sensation seeking) did not affect the magnitude of the belief-outcome associations and would not have affected the results reported here materially.

As previously stated, our primary goal was to identify campaign themes that had the potential to work in positive ways across audience sub-groups. We conducted moderator analyses examining whether the percentage to gain value for each theme differed significantly ($p < .05$; approximated by showing non-overlapping 83% confidence intervals[38,39]) across audience sub-groups defined by 5 characteristics: sex (boys vs girls); age (13–15 vs 16–17; 18–21 vs 22–25); race/ethnicity (non-Hispanic white vs non-Hispanic black vs Hispanic); education (high school or less vs at least some college); and sensation seeking (low vs high).

RESULTS

Our main objective is to provide campaign planners with the empirical data required to determine which of the themes that could form the basis of their campaign messages are most (and least) likely to achieve their campaign goals, across each of the 4 behavioral targets. We recognize that there are other important factors that require consideration when developing campaigns, including political, funding and strategic issues and the potential for creative success in developing messages about specific beliefs within a theme. Therefore, rather than focus on specific conclusions, we provide campaign planners with complete information by presenting quantitative data for all themes (Tables 3, 4, 5 and 6) and all individual beliefs within each theme (Tables B1, C1, D1, and E1 in the *online* supplementary material), across the 4 potential campaigns. We describe the steps that campaign planners should follow when using these data to inform their selection of promising themes and messages, and illustrate this process using findings for the *Prevent Initiation, 13- to 17-Year-Olds Campaign*.

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First, the campaign developer needs to identify the sub-set of themes that are plausible targets for a campaign sponsored by their organization. Second, they should rank this sub-set according to the RPI values. At this stage, it also may be important to consider the extent to which the candidate themes are likely to work in the same or different ways across segments of the target population. Findings from our sub-group analyses are summarized below and are shown in Tables B2, C2, C3, D2 and D3 in the *online* supplementary material. It also may be that campaign developers would prefer themes that are promising *across* behavioral targets – for example, for preventing initiation among 13- to 17-year-olds and 18- to 25-year-olds. In that case they would look for themes with high RPIs across both behavioral targets. Once the most desirable theme for a given campaign has been identified, it is critical that campaign planners then consider findings for the individual beliefs within that theme to ensure that campaign messages will target the most promising of the relevant beliefs. As shown in Tables B1, C1, D1, and E1 in the *online* supplementary material, within many of the themes, there is substantial variation in the relative promise of individual beliefs.

We now elaborate on these steps using results for the *Prevent Initiation, 13- to 17-Year-Olds Campaign* as an example (Table 3). Suppose that campaign developers have decided that their campaign to prevent initiation among youth could feasibly target any of the 20 themes listed in the first column of Table 3. Our analysis of the survey data shows that indeed all 20 themes would be at least somewhat promising; all percentages to gain are positive, all odds ratios are positive and range in size from 1.77 to 4.97, and the percentage to move values vary between 24% and 74%. Therefore, none of these themes would be expected to have detrimental effects if they were the basis of a campaign. However, looking at the RPI values we also see that 4 of the themes are relatively more promising. The Expression of Independence (Smoking) (RPI=79), Injunctive Social Norms from Peers (77), Social Perceptions (Smoking) (73), and Mood Effects (72) themes are all at least one SD above the mean in percentage to gain, and the percentages to move for these themes are all approximately 50%, indicating a reasonable proportion of the population available to be affected by the campaign. Conversely, 3 of the themes are relatively less promising and so should be avoided: Injunctive Social Norms from Parents (21), Expression of Independence (Not Smoking) (28), and Harmful Ingredients: Health Effects Framing (33).

Sidestepping for now the consideration of subgroup differences, suppose then that the campaign developers decide they are most interested in developing a campaign that focuses on peer disapproval of smoking (Injunctive Social Norms from Peers theme). Directing their attention to the detailed results for each belief within this theme (Table B1), they will see that of the 6 individual beliefs that comprise this theme, 3 were highly ranked and so are most promising as the basis for effective campaign messages: “If I smoke, it is very… unlikely that others my age will accept it (percentage to gain = 13.8%); unlikely my friends will accept it (13.5%); and likely that others my age will disapprove (13.1%).” Using these data, the campaign developer might choose to create campaign messages meant to persuade youth that it is unlikely that their friends will accept their smoking.

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Consistency across Campaigns

Whereas some campaign developers might want to follow the process described above to select the most promising theme/s and belief/s for each specific target audience and behavior, others might want to select a theme that shows some promise across both age groups and all targeted behaviors, with the goal of creating a unified campaign presence (which provides opportunities for reinforcement effects and repeated exposure) or of even using the same campaign message to reach multiple audiences and behaviors. In Table 7, we present RPI values for the 20 themes across all 4 campaigns to highlight consistency in which themes are most promising. For all 4 campaigns, the Mood Effects theme was categorized as particularly promising, and for 3 campaigns, the Injunctive Social Norms from Peers and Social Perceptions (Smoking) themes also were ranked as promising. There was less consistency in which themes were relatively less promising, although the Harmful Ingredients: Health Effects Framing theme was less promising for both of the initiation campaigns (Table 7).

Sub-group Differences

It also may be important to consider the extent to which candidate themes are likely to work in the same or different ways across audience segments. We assessed whether the percentage to gain value for each theme differed according to demographic characteristics (moderation analyses; see Tables B2, C2, C3, D2 and D3 in the *online* supplementary material). We present the detailed findings for each theme, thereby allowing campaign planners to examine and use these data if they wish to develop campaign messages that target specific audience sub-groups: if this is the case, then they might choose to focus on themes that perform particularly well for their group of interest. However, if planners need to develop a single common denominator campaign that can be used to reach most or all segments of the target audience, then they will be looking to identify campaign themes that will work across all audience segments. We report the proportion of all moderation tests that were statistically significant ($p < .05$), noting that the number of moderation tests conducted per campaign varies according to (1) availability of intention and/or behavior analyses; (2) the number of moderators; and (3) the number of sub-groups per moderator (one test for variables with 2 sub-groups (sex, age, education, sensation seeking); 2 tests for the variable with 3 sub-groups (race/ethnicity)). Sub-group analyses could not be conducted for the *Encourage Cessation, 18- to 25-Year-Olds Campaign*, due to the small size of the former smoker group.

For the *Prevent Initiation, 13- to 17-Year-Olds Campaign* we conducted 100 moderation tests and 7% were significant (Table B2). There were zero (of 20) differences in theme promise by sex, 2 of 20 differences by age, 3 of 40 differences by race/ethnicity, and 2 of 20 differences by sensation seeking. There are several ways to interpret this set of results. On the one hand, only 7 of 100 moderation tests were statistically significant and there was little evidence that moderation was common for any single moderator. This would suggest the few significant results reflect chance (particularly given that these analyses did not adjust for multiple comparisons), and lead to a conclusion that particular sub-groups do not differ in the likely promise of any of the themes. From a common denominator perspective, one might note that these differences were distributed across 6 of 20 themes, indicating that there are 14 themes for which there were no significant sub-group differences; these 14 themes

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would be expected to work in the same way for all segments of the target audience. From a differentiated campaign perspective, the focus would be on identifying those themes that worked particularly well for the group of interest.

For the *Prevent Initiation, 18- to 25-Year-Olds Campaign*, we conducted 240 moderation tests across the intention and behavior analyses, 16% of which were significant (Tables C2 and C3). Sex was a significant moderator in 10 of 40 tests, age was a moderator in 9 of 40, education was a moderator in 6 of 40, race/ethnicity was a moderator in 7 of 80, and sensation seeking was a moderator in 7 of 40 tests. These differences were distributed across 15 of 20 themes, leaving 5 themes expected to work in the same way across all audience segments.

For the *Stop Progression, 18- to 25-Year-Olds Campaign*, 5% of 240 tests were statistically significant (Tables D2 and D3). Sex was a significant moderator in 2 of 40 tests, age was a moderator in 1 of 40, education was a moderator in 2 of 40, race/ethnicity was a moderator in 4 of 40, and sensation seeking was a significant moderator in 2 of 40 tests. These results most likely reflect chance. But, the alternative interpretation notes that these differences were distributed across 8 of the 20 themes, leaving 12 themes expected to work in the same way across all audience segments.

DISCUSSION

We used a systematic empirical approach to identify the themes and beliefs most likely to lead to effective (and ineffective) campaigns to reduce smoking among the general population of youth and young adults. We described and demonstrated the process for using this data, using findings for a campaign to prevent smoking initiation among 13-to 17-year-olds as an example. Findings demonstrated consistency across the different behavioral targets in which themes were ranked as most promising based on their potential percentage to gain (Mood Effects, Social Perceptions of Smoking, and Injunctive Social Norms from Peers), highlighting the possibility of adopting the economical solution of using one theme to reach multiple target behaviors and audiences. We also identified at least 5 themes per campaign that would be expected to work in a similar way across all segments of the target audience, adding to the body of evidence that it is possible to create campaigns that work well for many sub-groups.[1,2,4,22,25,40–43]

Further insight into some of the practical issues and considerations involved in using this data can be gleaned from understanding the original context for these analyses. In 2012 the US Food and Drug Administration (FDA) announced plans to spend $600 million over 5 years on mass media campaigns to reduce tobacco use. Such a substantial investment required empirical research to identify the campaign strategies most likely to be successful, and so the data collected from 13- to 17-year-olds in this study were provided to the FDA as they worked to develop a campaign to reduce initiation and progression to regular smoking among adolescents. Under the Family Smoking Prevention and Tobacco Control Act of 2009,[44] the FDA has authority to educate the public only about tobacco products, their uses, and their health effects. Therefore, only a small subset of the 20 themes was deemed a plausible target for an FDA-lead campaign—specifically Addiction, Harmful Ingredients:

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Common Products, Harmful Ingredients: Health Effects, Physical (Cosmetic) Effects, Physical (Health) Effects, and Youth Susceptibility to Health Effects. Among these 6 plausible themes, and when examining the data for the 13-17 year olds only, Physical (Cosmetic) Effects (RPI=54) and Addiction (RPI=49) were the most promising themes (Table 3). The FDA's first phase of "The Real Cost" campaign launched in February 2014 and was comprised of 2 television advertisements addressing the cosmetic effects of smoking and a second set of advertisements that focused on the way in which addiction leads to a loss of control and independence.[45] The FDA has publicly noted that its decision to target these themes reflected, in part, the results from this study.

It is important to keep in mind some of the strengths and limitations associated both with the Hornik and Woolf approach in general,[12] and as applied in the current study. One of the strengths of this method is that the target audience provides evidence supporting potential message strategies across a wide number of diverse possibilities, thereby minimizing the unintentional biases potentially introduced when messages are subjectively selected by campaign planners, funders, or researchers. However, one of the limitations is that our assessment of campaign theme promise was limited to the *potential* gain in intentions and/or behaviors that could be achieved by each theme, and could not practically extend to a measure of actual message impact. Although, compared to other approaches that interpret survey data by focusing only on the relative strength of the belief-intention or belief-behavior associations, this method takes into account the observed availability of people to be moved by a given campaign, and acknowledges that campaign developers must make a subjective assessment of the feasibility of a belief being changed by a campaign message.[12] Yet, whereas the cross-sectional data provide evidence of associations between beliefs and intentions and behaviors, they do not provide evidence that beliefs cause these intentions, or that beliefs explain the smoking status of individuals. If intentions or current behaviors instead cause beliefs, or these associations are explained by unmeasured confounders, then changing beliefs with a campaign message would not necessarily increase the likelihood of intention or behavior change.

Another strength of this method is that the systematic approach allows promising and unpromising themes to be identified from a large and diverse set of potential themes. Despite our effort to measure the full range of plausible themes for campaigns targeted at youth and young adults, in this study we did not include any beliefs tapping attitudes towards the tobacco industry, even though anti-industry messages have been used effectively in previous youth-targeted campaigns.[46–48] When developing the survey, we were particularly focused on the capacity of this data to inform the FDA's campaign development work, and we knew that a campaign developed by the FDA could not adopt an anti-industry theme. Nonetheless, the omission of this theme remains a limitation of the study. Campaign developers should remain open to the possibility of using anti-industry themes in future campaigns to reduce tobacco use among young people. An additional limitation is that most participants were recruited from an opt-in online panel. Although the SSI panel is comprised of more than one million individuals who vary widely in their characteristics, it cannot be considered representative of the US population. All samples were weighted to be representative of the underlying population in terms of sex, age, race, ethnicity, and the proportion living in metropolitan areas, and the older group also was weighted in terms of education, and

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sampled using quotas to get a range of smoking statuses; nonetheless, our ability to generalize these findings to the general population is constrained.

It is critical that the quantitative findings presented here are interpreted with an eye to the likelihood that a successful campaign could be built around each potential theme. Some beliefs will be more amenable than others to being changed by a campaign message, and some will lend themselves better to being the target of a campaign employing persuasive executional characteristics.[12] Therefore, selection of campaign themes and messages also should be informed by message effect theories,[49] evidence about what themes and executional styles have worked in previous campaigns,[1,2,4,5] and the use of additional research methods such as focus groups or quantitative message testing studies to pre-test alternative concepts.[17] Therefore, although these data do not instruct us in how exactly to create more persuasive antismoking mass media campaigns,[49] they do help to reduce uncertainty regarding one critical component of the campaign development process, that is, what the messages should be about.

IMPLICATIONS FOR TOBACCO REGULATION

Antismoking mass media campaigns are critical to efforts to reduce tobacco use among youth and young adults. Formative research plays a critical role in ensuring the effectiveness of these campaigns, and so in this study we used a systematic empirical approach to identify the campaign themes and beliefs most likely to lead to effective (and ineffective) campaigns to reduce smoking among the general population of youth and young adults. Data presented here provide regulators with an objective and robust method for choosing among the large number of potential themes that could be targeted in their campaigns to prevent initiation, stop progression, and encourage smoking cessation. Careful consideration of these data will ensure that future campaigns adopt the themes most likely to contribute to important changes in smoking intentions and behaviors among youth and young adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. National Cancer Institute (NCI). Assessing the effectiveness of the mass media in discouraging smoking behavior. In: Davis, RM.Gilpin, EA.Loken, B., et al., editors. The Role of the Media in Promoting and Reducing Tobacco Use. Tobacco Control Monograph No 19. Bethesda, MD: US

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2008. p. 479-546.NIH Pub. No 07-6242

2. US Department of Health and Human Services (USD-HHS). Efforts to prevent and reduce tobacco use among young people. In: Perry, CL.Stigler, MH.Norman, L., Taylor, PL., editors. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: USDHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. p. 631-845.
3. Brinn MP, Carson KV, Esterman AJ, et al. Cochrane review: mass media interventions for preventing smoking in young people. Evid Based Child Health. 2012; 7(1):86–144.
4. Allen JA, Duke JC, Davis KC, et al. Using mass media campaigns to reduce youth tobacco use: a review. Am J Health Promot. 2015; 30(2):e71–e82. [PubMed: 25372236]
5. Niederdeppe J, Avery R, Byrne S, et al. Variations in state use of antitobacco message themes predict youth smoking prevalence in the USA, 1999–2005. Tob Control. 2016; 25(1):101–107. [PubMed: 25550420]
6. White VM, Durkin SJ, Coomber K, et al. What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. Tob Control. 2015; 24(2):198–204. [PubMed: 23988860]
7. World Health Organization. WHO Framework Convention on Tobacco Control. Available at: http://whqlibdoc.who.int/publications/2003/9241591013.pdf Accessed July 21, 2016
8. World Health Organization. WHO Report On The Global Tobacco Epidemic, 2011. Warning About The Dangers Of Tobacco. Available at: http://www.who.int/tobacco/global_report/2011/en/ Accessed July 21, 2016
9. Botta RA, Dunker K, Fenson-Hood K, et al. Using a relevant threat, EPPM and interpersonal communication to change hand-washing behaviours on campus. J Commun Healthc. 2008; 1(4): 373–381.
10. Epton T, Norman P, Harris P, et al. Development of theory-based health messages: three-phase programme of formative research. Health Promot Int. 2015; 30(3):756–768. [PubMed: 24504361]
11. Fishbein M, Yzer MC. Using theory to design effective health behavior interventions. Commun Theory. 2003; 13(2):164–183.
12. Hornik R, Woolf KD. Using cross-sectional surveys to plan message strategies. Soc Mar Q. 1999; 5(2):34–41.
13. Hull SJ, Gasiorowicz M, Hollander G, et al. Using theory to inform practice: the role of formative research in the construction and implementation of the Acceptance Journeys social marketing campaign to reduce homophobia. Soc Mar Q. 2013; 19(3):139–155.
14. Jordan A, Piotrowski JT, Bleakley A, et al. Developing media interventions to reduce household sugar-sweetened beverage consumption. The ANNALS of the American Academy of Political and Social Science. 2012; 640(1):118–135.
15. Maddock JE, Silbanuz A, Reger-Nash B. Formative research to develop a mass media campaign to increase physical activity and nutrition in a multiethnic state. J Health Comm. 2008; 13(3):208–215.
16. Niederdeppe J, Porticella N, Shapiro MA. Using theory to identify beliefs associated with support for policies to raise the price of high-fat and high-sugar foods. J Health Comm. 2012; 17(1):90–104.
17. Parvanta S, Gibson L, Forquer H, et al. Applying quantitative approaches to the formative evaluation of antismoking campaign messages. Soc Mar Q. 2013; 19(4):242–264. [PubMed: 24817829]
18. Rhodes RE, Blanchard CM, Courneya KS, et al. Identifying belief-based targets for the promotion of leisure-time walking. Health Educ Behav. 2009; 36(2):381–393. [PubMed: 18077658]
19. Robbins R, Niederdeppe J. Using the integrative model of behavioral prediction to identify promising message strategies to promote healthy sleep behavior among college students. Health Commun. 2015; 30(1):26–38. [PubMed: 24446927]
20. Fishbein, M., Ajzen, I. Predicting and Changing Behavior: The Reasoned Action Approach. New York, NY: Taylor & Francis; 2010.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

21. Noar SM. An Audience–Channel–Message–Evaluation (ACME) framework for health communication campaigns. Health Promot Pract. 2012; 13(4):481–488. [PubMed: 21441207]
22. Hornik RC, Ramirez AS. Racial/ethnic disparities and segmentation in communication campaigns. Am Behav Sci. 2006; 49(6):868–884.
23. Haiman CA, Stram DO, Wilkens LR, et al. Ethnic and racial differences in the smoking-related risk of lung cancer. New Engl J Med. 2006; 354(4):333–342. [PubMed: 16436765]
24. US Department of Health and Human Services. Tobacco Use among U.S. Racial/Ethnic Minority Groups – African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General. Available at: www.cdc.gov/tobacco/data_statistics/sgr/1998/complete_report/index.htm. Accessed July 21, 2016
25. 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 segmentation necessary in anti-smoking campaigns? Health Educ Res. 2013; 28(5):857–868. [PubMed: 23720493]
26. US Department of Health and Human Services (USD-HHS). The epidemiology of tobacco use among young people in the United States and worldwide. In: Perry, CL.Stigler, MH.Norman, L., Taylor, PL., editors. Preventing Tobacco Use among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: USDHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. p. 129-168.
27. Survey Sampling International (SSI). Consumer online panel. Available at: https://www.surveysampling.com/audiences/consumer-online/. Accessed July 21, 2016
28. GfK. KnowledgePanel® (North America). Available at: http://www.gfk.com/en-us/products-a-z/knowledgepanelr-north-america/. Accessed July 21, 2016
29. US Department of Health and Human Services. Substance Abuse and Mental Health Services Administration: Centre for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health; 2010. Available at: http://doi.org/10.3886/ICPSR32722.v5. Accessed July 21, 2016
30. US Department of Health and Human Services. Substance Abuse and Mental Health Services Administration: Centre for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health; 2011. Available at: http://doi.org/10.3886/ICPSR34481.v3 Accessed July 21, 2016
31. Lee S, Brennan E, Gibson L, et al. Predictive validity of an empirical approach for selecting promising message topics: a randomized-controlled study. J Commun. 2016; 66(3):433–453. [PubMed: 27867218]
32. Mitchell, PK., Smith, WA. Social Marketing Lite for Energy Efficiency: A Practical Resource Book for Social Marketing. Washington, DC: Academy for Educational Development; 2000.
33. Brennan, E., Momjian, A., Jeong, M., et al. Mass media campaigns to reduce smoking among youth and young adults: documenting potential campaign targets and reviewing the evidence from previous campaigns. CECCR Working Paper SeriesAvailable at: http://repository.upenn.edu/cgi/viewcontent.cgi?article=1384&context=asc_papers. Accessed July 21, 2016
34. Brennan, E., Momjian, A., Jeong, M., et al. Identifying potential targets for a mass media campaign to reduce youth and young adult smoking behaviour. CECCR Working Paper SeriesAvailable at: http://repository.upenn.edu/asc_papers/449/. Accessed October 12, 2016
35. Bandura, A. Self-efficacy. In: Bandura, A., editor. Social Foundations of Thought and Action A Social Cognitive Theory. Englewood Cliffs, NJ: Prentice-Hall; 1986. p. 390-453.
36. Hoyle RH, Stephenson MT, Palmgreen P, et al. Reliability and validity of a brief measure of sensation seeking. Pers Individ Dif. 2002; 32:401–414.
37. Stata Statistical Software: Release 13 [computer program]. College Station TX: StataCorp LP; 2013.
38. Tryon WW. Evaluating statistical difference, equivalence, and indeterminacy using inferential confidence intervals: an integrated alternative method of conducting null hypothesis statistical tests. Psychol Methods. 2001; 6(4):371–386. [PubMed: 11778678]
39. Payton ME, Greenstone MH, Schenker N. Overlapping confidence intervals or standard error intervals: what do they mean in terms of statistical significance? J Insect Sci. 2003; 3(34):1–6. [PubMed: 15841218]

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40. Durkin S, Brennan E, Wakefield M. Mass media campaigns to promote smoking cessation among adults: an integrative review. Tob Control. 2012; 21(2):127–138. [PubMed: 22345235]
41. Wakefield M, Bayly M, Durkin S, et al. Smokers' responses to television advertisements about the serious harms of tobacco use: pre-testing results from 10 low- to middle-income countries. Tob Control. 2013; 22(1):24–31. [PubMed: 21994276]
42. Durkin S, Bayly M, Cotter T, et al. Potential effectiveness of anti-smoking advertisement types in ten low and middle income countries: do demographics, smoking characteristics and cultural differences matter? Soc Sci Med. 2013; 98:204–223. [PubMed: 24331900]
43. Murukutla N, Bayly M, Mullin S, et al. Male smoker and non-smoker responses to television advertisements on the harms of secondhand smoke in China, India, and Russia. Health Educ Res. 2015; 30(1):24–34. [PubMed: 25122618]
44. United States Public Laws. Public Law 111-31 [H.R. 1256]. 2009. Family Smoking Prevention and Tobacco Control Act.
45. US Food and Drug Administration. The Real Cost Campaign. Available at: http://www.fda.gov/TobaccoProducts/PublicHealthEducation/PublicEducationCampaigns/TheRealCostCampaign/default.htm. Accessed July 21, 2016
46. Niederdeppe J, Farrelly MC, Haviland ML. Confirming "truth": more evidence of a successful tobacco countermarketing campaign in Florida. Am J Public Health. 2004; 94(2):255–257. [PubMed: 14759936]
47. Farrelly MC, Nonnemaker J, Davis KC, et al. The influence of the national truth® campaign on smoking initiation. Am J Prev Med. 2009; 36(5):379–384. [PubMed: 19211213]
48. Richardson AK, Green M, Xiao H, et al. Evidence for truth®: the young adult response to a youth-focused anti-smoking media campaign. Am J Prev Med. 2010; 39(6):500–506. [PubMed: 21084069]
49. Cappella JN. Integrating message effects and behavior change theories: organizing comments and unanswered questions. J Commun. 2006; 56(Supp l1):S265–S279.

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Table 1

Definition, Size and Outcome Measures Used in Each Intention and Behavior Analysis, for Each Campaign

	Analytic sample	Definition of analytic sample	Outcome measure
***Prevent Initiation, 13- to 17-Year-Olds* Campaign**			
Intention Analysis	N = 1141 current nonsmokers	Current nonsmoker: no intention to smoke in next 30 days[a]	*No intention to use tobacco*[b] Very unlikely to (all 5) (72%): Smoke even 1 or 2 puffs over the next year; Be smoking every day 1 year from now; Be smoking, but not every day, 1 year from now; Be smoking any other form of tobacco, other than cigarettes, 1 year from now[c]; Be using any smokeless tobacco 1 year from now[d]
***Prevent Initiation, 18- to 25-Year-Olds* Campaign**			
Intention Analysis	N = 1049 never tobacco users	Never tobacco users: never even tried a puff of a cigarette and had not used any other smoked[c] or smokeless[d] tobacco in past 30 days[e]	*No intention to use tobacco* As above (76%)
Behavior Analysis	N = 1049 never tobacco users vs N = 337 current tobacco users	Never tobacco users: as above Current tobacco users: used some tobacco in past 30 days (smoked cigarettes or used some other smoked[c] or smokeless[d] tobacco) and 18 years or older when they first tried a cigarette[f]	*Behavioral status* Being a never tobacco user (76%) vs current tobacco user (24%)
***Stop Progression, 18- to 25-Year-Olds* Campaign**			
Intention Analysis	N = 497 non-daily smokers	Non-daily smokers: current tobacco user who had smoked cigarettes in the past 30 days, but not every day	*No intention to smoke every day* Very unlikely to (33%): Be smoking every day 1 year from now
Behavior Analysis	N = 650 non-daily tobacco users vs N = 538 daily tobacco users	Non-daily tobacco users: current tobacco user who used some tobacco in past 30 days (smoked cigarettes or used some other smoked[c] or smokeless[d] tobacco), but did not use any of the types of tobacco every day Daily tobacco users: current tobacco user who used some tobacco (smoked cigarettes or used some other smoked[c] or smokeless[d] tobacco) every day in past 30 days	*Behavioral status* Being a non-daily tobacco user (55%) vs daily tobacco user (45%)
***Encourage Cessation, 18- to 25-Year-Olds* Campaign**			
Behavior Analysis	N = 101 former smokers vs N = 838 current smokers	Former smokers: smoked >100 cigarettes in lifetime but had not smoked a cigarette during the past 6 months and had not used any other tobacco in past 30 days Current smokers: smoked >100 cigarettes in lifetime and had smoked a cigarette in past 30 days	*Behavioral status* Being a former smoker (11%) vs current smoker (89%)

Note.

[a]Given legal concerns, Survey Sampling International (SSI) would not permit us to ask directly about youth smoking behavior. Therefore, we measured whether respondents intended to smoke within the next 30 days as a surrogate measure of smoking status. However, using the GfK, sample—where we were permitted to ask about both intention and behavior—we found that only 2.6% of those who did not intend to smoke in the

next 30 days reported that they had used some tobacco in the past 30 days, suggesting that about 97% of those who were classified as nonsmokers by the 30-day intention measure would have been classified as nonsmokers if we had a direct measure.

[b] Intentions to use tobacco were measured with between 3 and 5 sequential questions, depending on skip patterns. All questions were measured using a 5-point scale: very unlikely; unlikely; neither likely nor unlikely; likely; very likely.

[c] This question included the following examples of forms of tobacco products other than cigarettes: cigars, water pipes, cigarillos, little cigars, and pipes.

[d] This question included the following examples of smokeless tobacco: chewing tobacco, snuff, and dip.

[e] A limitation of this measure is that some of these respondents may have had some experience using smokeless or smoked (other than cigarettes) tobacco products prior to one month ago.

[f] We excluded those who had initiated cigarette smoking before 18 years of age to increase the comparability of the 2 groups used in the behavior analysis (the never tobacco users, by definition, would have to initiate tobacco use after 18 years of age) and to reduce the degree to which beliefs may have been affected by prior use.

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Table 2

Example Cross-tabulation of Beliefs and Intentions Used to Calculate the Three Quantitative Indicators of Belief Promise (Using Data from the *Prevent Initiation, 13- to 17-Year-Olds Campaign*)

	Belief: "If I smoke…I will develop sexual and/or fertility problems"		
Intention To Use Tobacco	**All others**	**Very likely (strong antismoking belief)**	**Overall**
All Others	40.8%	15.1%	30.5%
No Intention To Use Tobacco	59.2%	84.9%	69.5%
% in Column	59.9%	40.1%	100.0%
Three quantitative indicators used to summarize each such association:			
1. Odds ratio: 3.87 = (84.9/15.1) / (59.2/40.8)			
2. Potential percentage to move: 59.9			
3. Potential percentage to gain: 15.4 = 84.9 – 69.5			

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Table 3

Prevent Initiation, 13- to 17-Year-Olds Campaign: Results from Intention Analysis of 20 Potential Campaign Themes

			Intention Analysis		
Themes, Ordered From Most To Least Promising (N items per scale)	**N**	**Relative Promise Index**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**
Expression of Independence (Smoking) (3)	1063	79	12.8%	3.66	52%
Injunctive Social Norms from Peers (6)	1121	77	12.5%	3.10	60%
Social Perceptions (Smoking) (23)	1134	73	11.9%	3.39	51%
Mood Effects (10)	1134	72	11.7%	3.66	46%
Self-efficacy (3)	1133	58	9.6%	4.97	28%
Impact on Sports[a] **(3)**	510[a]	57	9.5%	3.64	35%
General Social Norms (Smoking) (2)	1027	55	9.2%	2.12	66%
Endangering Others[a] **(4)**	539[a]	55	9.1%	4.28	30%
Physical (Cosmetic) Effects (10)	1132	54	9.0%	3.41	35%
Addiction (5)	1120	49	8.3%	2.45	47%
General Social Norms (Not Smoking) (2)	1007	47	8.0%	1.80	74%
Harmful Ingredients: Common Products[b] **(13)**	572[b]	45	7.7%	2.47	41%
Physical (Health) Effects (31)	1134	45	7.6%	2.87	35%
Peer Pressure From Others (2)	1134	43	7.3%	3.28	29%
Social Perceptions (Not Smoking) (10)	1132	39	6.7%	1.77	61%
Youth Susceptibility to Health Effects (3)	1134	38	6.6%	2.35	37%
Cost of Smoking[a] **(5)**	554[a]	37	6.4%	2.94	27%
Harmful Ingredients: Health Effects[b] **(13)**	562[b]	33	5.8%	2.45	32%
Expression of Independence (Not Smoking) (3)	1083	28	5.1%	1.79	42%
Injunctive Social Norms from Parents (3)	1061	21	4.1%	2.22	24%

Note.

N = 1141 (total sample; weighted). To learn about a large number of beliefs, we randomly assigned participants to see subsets of beliefs, leading to variations in the number of respondents who provided valid data for each scale.

[a]In the study with 13- to 17-year-olds, respondents were randomly assigned to 1 of 2 conditions. In the Puff Stem Condition, questions began with “If I smoke even 1 or 2 puffs, I will…”, whereas in the Daily Stem Condition, questions began with “If I smoke every day, I will…”. Although most belief items were able to be asked using both versions of the question stems, beliefs in the Cost of Smoking, Endangering Others, and Impact on Sports themes were only able to be asked in the Daily Stem Condition, and therefore, were only answered by about half of the sample. For all other themes, preliminary

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analyses indicated that the 2 stem conditions produced results that were largely similar, and by combining the data (ie, essentially disregarding this variation in the question stem), we were able to increase the sample size and hence the stability of our results.

[b] in the Harmful Ingredients: Common Products theme combined the name of a harmful ingredient with a common product in which it is found (eg, “If I smoke every day I will inhale mercury, which is found in mascara”). Items in the Harmful Ingredients: Health Effects theme combined the name of the harmful ingredient with a specific health effect that it causes (eg, “If I smoke every day I will inhale mercury, which causes cancer”). Half of the respondents received items only from the Harmful Ingredients: Common Products theme, and the other half received items only from the Harmful Ingredients: Health Effects theme.

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Table 4

Prevent Initiation, 18- to 25-Year-Olds Campaign: Results from Intention and Behavior Analyses of 20 Potential Campaign Themes

			Intention Analysis			Behavior Analysis		
Themes, Ordered From Most To Least Promising (N items per scale)	**N**	**Relative Promise Index**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**
Injunctive Social Norms from Peers (6)	1372	77	8.7%	2.17	62%	16.4%	5.54	69%
Mood Effects (10)	1386	76	8.8%	2.82	44%	16.1%	6.80	54%
Social Perceptions (Smoking) (23)	1386	75	8.7%	2.76	45%	15.9%	6.53	55%
Expression of Independence (Smoking) (3)	1220	65	8.3%	2.52	48%	13.5%	4.49	55%
Physical (Health) Effects (31)	1386	58	7.8%	3.21	34%	12.0%	4.84	43%
Self-efficacy (3)	1386	56	8.4%	6.93	20%	10.2%	5.87	29%
General Social Norms (Smoking) (2)	1115	55	8.1%	1.95	65%	10.3%	2.42	69%
Harmful Ingredients: Common Products[a] (13)	698[a]	49	8.1%	3.24	35%	8.2%	2.75	42%
Youth Susceptibility to Health Effects (3)	1386	48	7.7%	2.78	38%	9.1%	3.05	45%
Social Perceptions (Not Smoking) (10)	1386	46	7.8%	2.14	55%	8.0%	2.17	59%
Impact on Sports (3)	1222	45	7.5%	2.93	35%	8.5%	2.95	42%
Endangering Others (4)	1313	45	6.9%	2.86	32%	10.0%	3.93	40%
General Social Norms (Not Smoking) (2)	1102	44	8.0%	1.91	73%	6.7%	1.66	76%
Physical (Cosmetic) Effects (10)	1386	44	7.1%	2.99	32%	9.1%	3.50	39%
Peer Pressure from Others (2)	1386	41	5.4%	2.06	38%	12.4%	4.62	47%
Addiction (5)	1353	39	6.6%	2.75	32%	8.8%	3.29	40%
Expression of Independence (Not Smoking) (3)	1274	37	6.5%	2.15	43%	8.5%	2.68	49%
Injunctive Social Norms from Parents (3)	1226	37	5.4%	1.98	41%	10.9%	3.66	48%
Cost of Smoking (5)	1341	36	6.2%	3.08	27%	8.7%	3.80	34%
Harmful Ingredients: Health Effects[a] (13)	688[a]	27	5.4%	2.68	26%	7.6%	3.62	33%

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Note.

N = 1049 for the intention analysis and N = 1387 for the behavior analysis (weighted). To learn about a large number of beliefs, we randomly assigned participants to see subsets of beliefs, leading to variations in the number of respondents who provided valid data for each scale.

[a]= Items in the Harmful Ingredients: Common Products theme combined the name of a harmful ingredient with a common product in which it is found (eg, “If I smoke every day I will inhale mercury, which is found in mascara”). Items in the Harmful Ingredients: Health Effects theme combined the name of the harmful ingredient with a specific health effect that it causes (eg, “If I smoke every day I will inhale mercury, which causes cancer”). Half of the respondents received items only from the Harmful Ingredients: Common Products theme, and the other half received items only from the Harmful Ingredients: Health Effects theme.

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Table 5

Stop Progression, 18- to 25-Year-Olds Campaign: Results from Intention and Behavior Analyses of 20 Potential Campaign Themes

			Intention Analysis			Behavior Analysis		
Themes, Ordered From Most To Least Promising (N items per scale)	**N**	**Relative Promise Index**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**
Injunctive Social Norms from Peers (6)	1070	83	28.7%	3.74	91%	23.6%	3.29	91%
Mood Effects (10)	1188	76	32.0%	4.77	87%	15.0%	2.09	87%
Physical (Health) Effects (31)	1188	61	23.6%	4.14	72%	10.8%	1.86	72%
Injunctive Social Norms from Parents (3)	1050	60	13.5%	2.18	76%	18.8%	2.87	77%
Social Perceptions (Smoking) (23)	1188	57	15.5%	2.14	86%	15.0%	2.10	86%
Self-efficacy (3)	1188	57	20.2%	4.46	62%	10.7%	2.02	62%
Expression of Independence (Smoking) (3)	1061	55	19.8%	2.80	82%	9.2%	1.59	82%
Endangering Others (4)	1126	54	21.0%	3.78	69%	7.4%	1.54	70%
Physical (Cosmetic) Effects (10)	1188	49	15.5%	2.80	67%	8.3%	1.67	66%
Harmful Ingredients: Common Products[a] (13)	593 [a]	46	15.5%	3.49	54%	6.5%	1.59	58%
Social Perceptions (Not Smoking) (10)	1188	46	12.7%	2.06	76%	8.4%	1.58	76%
Impact on Sports (3)	1060	45	16.0%	3.16	62%	4.8%	1.37	62%
Youth Susceptibility to Health Effects (3)	1188	44	14.1%	2.70	63%	5.9%	1.45	64%
General Social Norms (Smoking) (2)	951	43	25.2%	3.58	85%	-4.9%	0.79	84%
Addiction (5)	1163	42	13.7%	2.64	63%	4.4%	1.33	61%
Cost of Smoking (5)	1159	42	16.3%	3.91	56%	2.1%	1.17	54%
Peer Pressure from Others (2)	1188	40	6.3%	1.43	77%	9.7%	1.68	77%
Expression of Independence (Not Smoking) (3)	1088	38	12.3%	2.19	69%	3.0%	1.19	69%
Harmful Ingredients: Health Effects[a] (13)	595[a]	37	12.7%	3.11	56%	1.4%	1.11	53%
General Social Norms (Not Smoking) (2)	962	26	-0.8%	0.96	86%	4.7%	1.25	85%

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Note.

N = 497 for the intention analysis and N = 1188 for the behavior analysis (weighted). To learn about a large number of beliefs, we randomly assigned participants to see subsets of beliefs, leading to variations in the number of respondents who provided valid data for each scale.

[a]Items in the Harmful Ingredients: Common Products theme combined the name of a harmful ingredient with a common product in which it is found (eg, “If I smoke every day I will inhale mercury, which is found in mascara”). Items in the Harmful Ingredients: Health Effects theme combined the name of the harmful ingredient with a specific health effect that it causes (eg, “If I smoke every day I will inhale mercury, which causes cancer”). Half of the respondents received items only from the Harmful Ingredients: Common Products theme, and the other half received items only from the Harmful Ingredients: Health Effects theme.

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Table 6

Encourage Cessation, 18- to 25-Year-Olds Campaign: Results from Behavior Analyses of 20 Potential Campaign Themes

			Behavior Analysis		
Themes, Ordered From Most To Least Promising (N items per scale)	**N**	**Relative Promise Index**	**Percentage To Gain**	**Odds Ratio**	**Percentage To Move**
Social Perceptions (Smoking) (23)	939	91	23.1%	6.30	88%
Mood Effects (10)	939	87	21.8%	5.49	89%
Self-efficacy (3)	939	64	14.1%	9.78	65%
Physical (Health) Effects (31)	939	62	13.7%	4.79	76%
Expression of Independence (Smoking) (3)	846	56	11.7%	3.07	85%
Peer Pressure from Others (2)	939	55	11.3%	3.50	78%
Physical (Cosmetic) Effects (10)	939	54	11.0%	4.56	69%
Expression of Independence (Not Smoking) (3)	859	53	10.7%	4.00	70%
Endangering Others (4)	894	48	9.0%	3.33	72%
Impact on Sports (3)	854	48	9.0%	4.10	63%
Social Perceptions (Not Smoking) (10)	939	47	8.4%	2.51	80%
Injunctive Social Norms from Peers (6)	926	45	7.9%	2.02	94%
General Social Norms (Not Smoking) (2)	752	43	7.1%	2.09	87%
Youth Susceptibility to Health Effects (3)	939	40	6.1%	2.45	66%
Cost of Smoking (5)	919	39	6.0%	3.29	55%
Injunctive Social Norms from Parents (3)	838	39	6.0%	1.88	84%
Harmful Ingredients: Common Products[a] (13)	453[a]	38	5.6%	2.79	61%
Harmful Ingredients: Health Effects[a] (13)	486[a]	35	4.7%	2.39	53%
General Social Norms (Smoking) (2)	760	29	2.6%	1.39	84%
Addiction (5)	920	26	1.6%	1.27	66%

Note.

N = 939 (weighted). In order to learn about a large number of beliefs, we randomly assigned participants to see subsets of beliefs, leading to variations in the number of respondents who provided valid data for each scale.

[a]Items in the Harmful Ingredients: Common Products theme combined the name of a harmful ingredient with a common product in which it is found (eg, “If I smoke every day I will inhale mercury, which is found in mascara”). Items in the Harmful Ingredients: Health Effects theme combined the name of the harmful ingredient with a specific health effect that it causes (eg, “If I smoke every day I will inhale mercury, which causes cancer”). Half of the respondents received items only from the Harmful Ingredients: Common Products theme, and the other half received items only from the Harmful Ingredients: Health Effects theme.

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Table 7

Relative Promise Index Values for Each Theme across Campaigns

Themes, Ordered From Most To Least Promising On Average Across Campaigns	Prevent Initiation, 13- to 17- Year Olds Campaign	Prevent Initiation, 18- to 25- Year Olds Campaign	Stop Progression, 18- to 25-Year Olds Campaign	Encourage Cessation, 18- to 25-Year Olds Campaign
Mood Effects	72	76	76	87
Social Perceptions (Smoking)	73	75	57	91
Injunctive Social Norms from Peers	77	77	83	45
Expression of Independence (Smoking)	79	65	55	56
Self-efficacy	58	56	57	64
Physical (Health) Effects	45	58	61	62
Endangering Others	55	45	54	48
Physical (Cosmetic) Effects	54	44	49	54
Impact on Sports	57	45	45	48
General Social Norms (Smoking)	55	55	43	29
Peer Pressure from Others	43	41	40	55
Harmful Ingredients: Common Products	45	49	46	38
Social Perceptions (Not Smoking)	39	46	46	47
Youth Susceptibility to Health Effects	38	48	44	40
General Social Norms (Not Smoking)	47	44	26	43
Injunctive Social Norms from Parents	21	37	60	39
Addiction	49	39	42	26
Expression of Independence (Not Smoking)	28	37	38	53
Cost of Smoking	37	36	42	39
Harmful Ingredients: Health Effects	33	27	37	35

Note.

Different shades of gray identify themes for which the value on the Relative Promise Index was > 1 standard deviation (SD) above the mean (RPI>67; light gray; most promising themes), within 1 SD of the mean (33<RPI<67; dark gray), or < 1 SD below the mean (RPI<33; no color; least promising themes). The Relative Promise Index is an index of standardized values, scaled to a 0–100 scale where 0 = 3 SDs below the mean, 50 = mean, and 100 = 3 SDs above the mean.