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Identifying Potential Target Beliefs for a Smoking Prevention Mass Media Campaign: Final Findings and Recommendations for 18 – 25 year old never tobacco users

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Identifying potential target beliefs for a <u>smoking prevention</u> mass media campaign: Final findings and recommendations for 18 – 25 year old never tobacco users

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1. Objective

Our aim was to identify promising message themes (sets of beliefs), and within each theme, specific messages (beliefs), for a campaign aimed at preventing smoking initiation among 18 – 25 year olds who have never used tobacco. In order to identify promising (and unpromising) target beliefs, we have followed a methodological approach that uses cross-sectional quantitative data to assess the association between beliefs about the consequences of smoking and intentions to smoke in the future (Hornik & Woolf, 1999).

2. Methods

2.1. Analytic Approach

In this report, our focus was on identifying potential themes to target in a campaign aimed at preventing smoking initiation among 18 – 25 year olds.[1] According to theories of behavioral prediction (e.g., the Theory of Reasoned Action; Fishbein & Ajzen, 2010), reductions in smoking initiation are likely to be achieved by reducing the number of smokers who have some openness (i.e., intentions) to smoke; and reductions in the number of smokers who intend to smoke are likely to be achieved by increasing endorsement of the smoking-related beliefs that are most strongly associated with having *no* intention to smoke. As such, the target audience of these campaign messages is assumed to be never smokers who have *some* intention to smoke, with the expectation being that the messages will reduce that intention and also the likelihood of subsequent smoking initiation. In order to identify the most promising message themes (sets of beliefs), and within each theme, specific messages (beliefs), to be targeted in a prevention campaign, we conducted two parallel, but distinct analyses.

In the first set of analyses, intentions were used as the outcome variable (i.e., *some* intention vs. *no* intention to smoke). The *intention analysis* compared the rate of endorsement of beliefs among never smokers with *no* intention to smoke with that of never smokers with *some* intention

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[1] Other versions of this report focus on identifying potential themes for a campaign aimed at preventing smoking initiation among 13 – 17 year olds (shared with the FDA on April 23rd, 2013); themes for a campaign aimed at preventing smoking progression among 18 – 25 year olds (shared with the FDA on November 1st, 2013); and themes for a campaign aimed at encouraging smoking cessation among 18 – 25 year olds (shared with the FDA on November 1st, 2013).

to smoke. In the second set of analyses, smoking status was the outcome variable (i.e., *current* smokers vs. *never* smokers). The *behavior analysis* compared the rate of belief endorsement among never smokers and current smokers, and therefore went some way to identifying the beliefs that may distinguish those who had and had not initiated smoking.

Both sets of analyses had certain benefits and drawbacks. The *intention analysis* looked at the right people: it compared the beliefs held by the group of young adults whose beliefs we are hoping to change with the campaign message (i.e., never smokers with *some* intention to smoke) to the beliefs held by the group whose status is the goal—never smokers with *no* intention to smoke. However, because intentions do not always turn into action, there is some risk of error when we rely on intentions as a proxy for what we really want to predict: whether or not young adults will initiate smoking. The *behavior analysis*, which relied on actual (reports of) behavior as the outcome, made use of a much 'harder' outcome. We may be more confident in a behavioral measure than in an intentions measure. On the other hand, the behaviors being assessed (prior smoking and non-smoking) occurred before the measurement of the beliefs; therefore, we cannot be sure that the measured beliefs were actually in place before the prior decision to smoke or not. This makes us less certain that any observed association between beliefs and behavior reflects the influence of the beliefs on the behavior rather than vice versa. The *intention analysis* offered the benefit of ruling out this possibility of reverse causation because it examined the association of currently measured beliefs with intentions for future behavior within the sample of never smokers (whose beliefs could not have been impacted by their smoking behavior). Both approaches thus had particular strengths and weaknesses, and so we undertook both sets of analyses and reported the findings from each, but then also combined the results in order to get a unified picture of which themes were most promising overall.

2.2. Sample
2.2.1. Initial Sample
Data for this study were collected from Survey Sampling International (SSI). In April 2013 we collected clean and complete data from 3,033 18 – 25 year olds recruited through SSI's opt-in online panel. Informed consent was collected before the survey commenced. In order to ensure that the distribution of smoking statuses in our sample matched that of 18 – 25 year olds in the

U.S. population (as assessed by the 2010 National Survey on Drug Use and Health (NSDUH)[2]), we applied quotas for the proportion of Never Smokers (never puffed a cigarette), Not Current Smokers (puffed a cigarette but not in the past 30 days), Not Daily Smokers (puffed a cigarette in the past 30 days, but not every day), and Daily Smokers (puffed a cigarette every day in the past 30 days) in the sample. The distribution of smoking statuses in our final sample of clean and complete data is within 1% of the NSDUH-based quotas (final sample: 37% Never Smokers; 29% Not Current Smokers; 17% Not Daily Smokers; and 17% Daily Smokers).

While the SSI panel is comprised of more than one million individuals who vary widely in their characteristics, it cannot be considered a representative sample of the U.S. population. Therefore, for each analysis, we weighted the samples (defined by their smoking behaviors) to match the sex, age, race/ethnicity, education and metropolitan living status characteristics of 18 – 25 year olds with the same smoking behaviors as measured in the 2011 NSDUH.

2.2.2. Analytic Sample

For the purposes of the current report, we selected two sub-samples for analysis. Specifically, for the *intention analysis*, we chose Never Tobacco Users, defined as those who had never puffed a cigarette and also had not used other smoked or smokeless tobacco products in the past 30 days. We compared the smoking-related beliefs held by those who had *no* intention to use any tobacco products with those who had *some* intention to use tobacco products. The unweighted sample size for the *intention analysis* was 1,079 Never Tobacco Users, and because some respondents had missing data on the variables used for weighting, the weighted sample size was 1,049.

For the *behavior analysis*, we compared the smoking-related beliefs held by Never Tobacco Users with those held by Current Tobacco Users, defined as those who had used smoked or smokeless tobacco products in the past 30 days, and who had initiated cigarette smoking at age 18 or older. We excluded those who had initiated cigarette smoking before 18 years of age in order to make the target group in the behavior analysis more similar to the target audience for the campaign (18 – 25 year olds who have never smoked). The original sample size (*n* = 1,420) for

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[2] NSDUH is an annual survey of the general U.S. civilian non-institutionalized population. Data is collected through nationally representative interviews with approximately 70,000 randomly selected individuals aged 12 and older.

the behavior analysis included 1,079 Never Tobacco Users (76%) and 341 Current Tobacco Users (24%). After weighting, the sample size for the behavior analysis was 1,386 (Never Tobacco Users = 1,049; Current Tobacco Users = 337).

2.3. Procedure

All data were collected using online surveys, which took respondents around 12 minutes to complete. This study was approved by the Institutional Review Board at the University of Pennsylvania.

2.4. Measures

2.4.1. Dependent Variables

2.4.1.1. Intention Analysis

For the intention analysis, we measured intentions to use tobacco products over the next year using between three and five sequential questions (due to skip patterns). Each question was measured using a five-point scale (*very unlikely*; *unlikely*; *neither likely nor unlikely*; *likely*; *very likely*): 1) "How likely is it that you will be smoking **every day** one year from now?" (asked of all respondents); 2) "How likely is it that you will be smoking, **but not every day**, one year from now?" (asked only of those who were *very unlikely*, *unlikely*, or *neither likely nor unlikely* to be smoking every day); 3) "How likely is it that you will smoke **even one or two puffs** over the next year?" (asked only of those who were *very unlikely*, *unlikely*, or *neither likely nor unlikely* to be smoking, but not every day); 4) "How likely is it that you will be smoking any form of tobacco, other than cigarettes (e.g., cigars, water pipes, little cigars, pipes) one year from now? (asked of all); and 5) "How likely is it that you will be using any form of smokeless tobacco (e.g., chewing tobacco, snuff, dip) one year from now? (asked of all).

We then created a composite measure of **no intention to use tobacco**, which compared respondents who answered *very unlikely* to all intention questions with all others. Just over three-quarters (76%) of 18 – 25 year old never tobacco users had *no* intention to use tobacco over the next year.

2.4.1.2. Behavior Analysis

For the behavior analysis, we compared two groups based on their smoking status: Never Tobacco Users and Current Tobacco Users who initiated cigarette smoking at age 18 or older. We identified Never Tobacco Users using three questions: 1) "Have you ever tried cigarette smoking, even one or two puffs?" (*Yes; No*); 2) "During the past 30 days, did you smoke any form of tobacco products other than cigarettes (e.g., cigars, water pipe, cigarillos, little cigars, pipe)?" (*Yes; No*); and 3) "During the past 30 days, did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, dip)?" (*Yes; No*). Those who responded "No" to all three questions were categorized as Never Tobacco Users (although we acknowledge that a limitation of this measure is that some of these respondents may have had experience prior to one month ago using smokeless or smoked (other than cigarettes) tobacco products).

Current Tobacco Users who initiated cigarette smoking at age 18 or older were identified using four questions: 1) "When was the last time you smoked a cigarette, even one or two puffs?" measured using a seven-point scale (*earlier today; not today, but sometime during the past 7 days; not during the past 7 days, but sometime during the past 30 days; not during the past 30 days, but sometime during the past 6 months; not during the past 6 months, but sometime during the past year; 1 to 4 years ago; 5 or more years ago*); 2) "During the past 30 days, did you smoke any form of tobacco products other than cigarettes (e.g., cigars, water pipe, cigarillos, little cigars, pipe)?" (*Yes; No*); 3) "During the past 30 days, did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, dip)?" (*Yes; No*); and 4) "How old were you when you first tried a cigarette?". Those who responded that they had used any tobacco product in the past 30 days ("Yes" to any of the first three questions), and who reported that they were 18 or older when they first tried a cigarette (from the fourth question) were categorized as Current Tobacco Users.

2.4.2. Independent Variables: Smoking-Related Beliefs

We began by conducting a comprehensive literature review to generate a list of factors that have been shown to be associated with smoking among young people, or which have been the target of prior smoking prevention campaigns (shared with the FDA on June 28th, 2012). We then created a shortlist of the factors, with a focus on identifying those that could serve as the broad

theme for an anti-tobacco campaign (e.g., addiction; health effects of smoking). For each of the 20 potential campaign themes that we identified, we then generated a set of specific beliefs that were thought to represent the larger theme, and which would provide the basis for a specific campaign message (e.g., "If I smoke every day, I will become addicted to nicotine"; "If I smoke every day, I will develop cancer").

2.4.2.1. Belief Items (Specific Messages)

Overall, we measured 164 beliefs, including beliefs about the consequences of smoking and the consequences of not smoking. One hundred and forty beliefs were measured with an introductory stem that began with "If I smoke every day, I will…". Of the remaining 24 belief items, 15 were introduced with the stem "If I do not smoke at all, I will…". Each respondent received half of the above items, randomly selected and ordered. We measured the remaining 12 belief items using introductory stems appropriate for the question, and all of these questions were asked of all respondents. For instance, beliefs about self-efficacy to resist cigarette offers were introduced with the stem "How sure are you that, if you really wanted to, you could say no to a cigarette offer if…", and beliefs about descriptive norms were introduced with the stem "How many others your age…". All belief items were measured using five-point scales, although the anchor points on these scales varied according to the type of belief being measured (e.g., *very unlikely – very likely; strongly disagree – strongly agree; not at all sure – completely sure*). However, for the current analyses, all items were dichotomized at the category that represented the strongest anti-smoking belief.

2.4.2.2. Belief Scales (Message Themes)

All of the individual belief items were included in the survey because we believed that they represented one of the 20 potential campaign themes. However, to confirm that the set of items generated for each theme did indeed represent the same underlying construct and could be combined into a composite scale, we conducted a factor analysis on each set of beliefs. Although we have not provided detailed results from the factor analyses in this report, it should be noted that this process lead to some minor refinement of the set of beliefs that was used to represent each message theme (i.e., exclusion of individual items that loaded on the factor at less than .40,

which resulted in 10 of the 164 individual belief items not being included in any scale; see the last sections of Appendix A).

For each message theme, we then averaged together the set of individual belief items that loaded highly on the factor to create a scale, and these scales were then dichotomized (facilitating the data analysis approach described in Section 2.5.1.). Respondents who had an average score greater than 4.0 on the continuous scales were compared to respondents who had an average score of 4.0 or less on the scale. Table 1 presents Cronbach's Alphas (scale reliabilities), the number of items comprising each of the 20 belief scales, and the number of participants with valid data for each scale.

Of the 20 potential campaign themes, we interpreted six as being most relevant to the FDA's regulatory authority. Although we acknowledge that the FDA and their campaign partners may have a different interpretation as to which themes can and cannot be tied to their regulatory authority, throughout this report we present results separately for the six *FDA Relevant* and the 14 *FDA Less Relevant* campaign themes.

2.5. Data Analysis
2.5.1. Quantitative Measures Assessing the Promise of Message Themes and Individual Beliefs

All analyses were conducted using Stata 12.0, adjusting for the effects of sample weighting on parameter estimates and standard errors. For each belief scale (message theme) and each individual belief, we calculated three quantitative indicators of how promising the theme/belief would be as a campaign target. First, we used logistic regression analyses (odds ratios (OR)) to assess the association between each scale (and individual belief) and the outcome variable (e.g., intention or behavior). An OR greater than 1.0 indicated that respondents who held the desired belief/s were *more* likely to have no intention to smoke or to be Never Tobacco Users than were those who did not hold the desired belief/s, whereas an OR less than 1.0 indicated that respondents who held the desired belief/s were *less* likely to have no intention to smoke or to be Never Tobacco Users. Second, we calculated the proportion of the population that did not already hold the desired belief/s and was therefore available to be influenced by the campaign, a

Table 1. *Belief Scales: Number of Participants with Valid Data, Number of Items per Scale and Scale Reliability*

	Number of Participants with Valid Data	Number of Individual Belief Items in Scale	Scale α
FDA Relevant			
Addiction	1353	5	.89
Harmful Ingredients: Common Products	698[a]	13	.97
Harmful Ingredients: Health Effects	688[a]	13	.97
Physical (Cosmetic) Effects	1386	10	.95
Physical (Health) Effects	1386	31	.97
Youth Susceptibility to Health Effects	1386	3	.79
FDA Less Relevant			
Cost of Smoking	1341	5	.93
Endangering Others	1313	4	.93
Expression of Independence (Smoking)	1220	3	.85
Expression of Independence (Not Smoking)	1274	3	.88
General Social Norms (Smoking)	1115	2	.72[b]
General Social Norms (Not Smoking)	1102	2	.69[b]
Impact on Sports	1222	3	.88
Injunctive Social Norms from Parents	1226	3	.78
Injunctive Social Norms from Peers	1372	6	.79
Mood Effects	1386	10	.95
Peer Pressure from Others	1386	2	.70[b]
Self-Efficacy	1386	3	.96
Social Perceptions (Smoking)	1386	23	.94
Social Perceptions (Not Smoking)	1386	10	.97

Note. Data from the analytic sample used in the *behavior analysis,* which includes $n = 1,049$ Never Tobacco Users and $n = 337$ Current Tobacco Users. In order to learn about a large number of beliefs we randomly assigned participants to see sub-sets of beliefs, leading to variations in the number of respondents who provided valid data for each scale.

ᵃ These scales include data from only half the sample. Beliefs about the harmful ingredients in tobacco products were measured in two ways, which differed only in terms of the way the information was framed. Items in the *Harmful Ingredients: Common Products Frame* theme combined the name of a harmful ingredient with a common product in which it is found (e.g., "If I smoke every day I will inhale mercury, which is found in mascara"). Items in the *Harmful Ingredients: Health Effects Frame* theme combined the name of the harmful ingredient with a specific health effect that it causes (e.g., "If I smoke every day I will inhale mercury, which causes cancer"). To avoid confusion and data contamination, half of the respondents received items only from the *Common Products Frame* theme, and the other half received items only from the *Health Effects Frame* theme.
ᵇ Because these scales only consisted of two items, we used a simple correlation between the items rather than Cronbach's Alpha.

measure that we call *potential percentage to move.* If the percentage to move was particularly low, this indicated that a large proportion of the population already held the desired belief/s and so there were few people available to be affected by a campaign message. By comparison, if the percentage to move was particularly high, this indicated that it could be difficult to convince people of this belief, or alternatively, that this may be new information for the majority of the population.

Third, we calculated a summary metric that we call *potential percentage to gain.* Percentage to gain is an indicator of how promising a message theme, or specific belief, is likely to be as the target of a campaign. In general, the higher the percentage to gain, the more promising the theme/belief is as a potential campaign target. Percentage to gain represents the estimated additional proportion of the population who would hold the desired intention or who would engage in the desired behavior, if 100% of the population endorsed the target theme/belief and the target belief was influential (Hornik & Woolf, 1999). It is calculated using a cross-tabulation of the belief and intention/ behavior measures. For example, as shown in Table 2, in the cross-tabulation of having no intention to use tobacco with the individual belief "If I smoke every day, I will feel more comfortable in social situations" (for this belief, the desired response was *very unlikely*), we see that overall, 75.8% of the respondents that were asked this question had no intention to use tobacco. But of those who gave the desired response of "*very unlikely* I will feel more comfortable in social situations", 87.6% had no intention to use tobacco. If the proportion

of the sample endorsing the belief could be increased to 100%, then it is estimated that an *additional* 11.8% of the population would have no intention to use tobacco. That is, the potential percentage to gain (under the best case scenario) is 11.8% (87.6% - 75.8% = 11.8%). While no campaign could expect to achieve complete persuasion, this method provides an estimate of the *maximum promise* of a campaign focused on increasing endorsement of this belief.

Similarly, as shown in Table 3, in the cross-tabulation of behavior status with the same individual belief "If I smoke every day, I will feel more comfortable in social situations", we see that overall, 74.7% of the respondents that were asked this question were Never Tobacco Users. But of those who gave the desired response of "*very unlikely* I will feel more comfortable in social situations", 87.8% were Never Tobacco Users. If the proportion of the sample endorsing the belief had been increased to 100%, then it is estimated that an *additional* 13.1% of the population would not have become Current Tobacco Users. That is, the potential percentage to gain (under the best case scenario) is 13.1% (87.8% - 74.7% = 13.1%).

Table 2. *Example Cross-Tabulation of Beliefs and Intentions*

(*n* = 518)	If I smoke every day, I will feel more comfortable in social situations		
Intention	All others	<u>Very unlikely</u>	Overall
All others	38.9%	12.4%	24.2%
No intention to use tobacco	61.1%	**87.6%**	**75.8%**
% in column	44.7%	55.3%	100%

Percentage to gain: 87.6% - 75.8% = 11.8%

Table 3. *Example Cross-Tabulation of Beliefs and Behaviors*

(*n* = 700)	If I smoke every day, I will feel more comfortable in social situations		
Behavior	All others	<u>Very unlikely</u>	Overall
Current Tobacco Users	36.9%	12.2%	25.3%
Never Tobacco Users	63.1%	**87.8%**	**74.7%**
% in column	52.9%	47.1%	100%

Percentage to gain: 87.8% - 74.7% = 13.1%

In general, a higher OR and a higher percentage to move will lead to a higher percentage to gain. Therefore, given that the percentage to gain captures the information that is provided both by the association between beliefs and intentions/behaviors (OR) and the percentage to move (Hornik & Woolf, 1999), primary consideration was given to these values when determining how promising each theme was likely to be.

It is important to note that the reported OR, percentage to move, and percentage to gain values were all obtained from analyses that were not adjusted for participant characteristics (that is, over and above the weighting adjustment). However, we conducted a set of sensitivity analyses to examine the extent to which the association between belief/s and intentions/behavior may have been confounded by the following set of characteristics (assessed using multivariate logistic regression analyses): gender; age; race/ethnicity; education; metropolitan living status; sensation seeking; whether or not the participant had a sibling who smoked; whether or not the participant lived with a smoker; and whether or not the participant had any close friends (of their four closest friends) who used tobacco. In the analyses using the belief scales, odds ratios from the adjusted models were strongly correlated with odds ratios from the unadjusted models (r = .99 for intention analyses and r = .97 for behavior analyses), indicating that the inclusion of the potential confounder variables had very little impact on the estimated strength of the association between the theme and the outcome. As such, we felt confident that the percentage to gain values would also not differ substantially when calculated from adjusted models, given that the percentage to move values (i.e., the proportion of the total sample endorsing the belief) would be the same whether adjusting for confounders or not (and percentage to gain captures both the OR and the percentage to move). We have therefore used unadjusted estimates throughout this report.

In the following section, we report and interpret results at the theme level only. For reference, the three indicators for the 164 individual beliefs (organized by theme) are provided at the end of the report as Appendix A. It is important to note that within many of the themes, there is substantial variation in the relative promise of each of the individual beliefs. Therefore, once a broad campaign theme is selected it is critical that the findings for the individual beliefs within that theme are considered, in order to ensure that campaign messages target the most promising of the

relevant beliefs. However, this task is complicated by some inconsistency in findings from the intention and behavior analyses. We recommend that attention is paid to both sets of findings when examining the individual beliefs, and that priority is given to those beliefs that were highly ranked (i.e., bolded in Appendix A) in both analyses, or were at least highly ranked in one analysis and not poorly ranked in the other (i.e., poorly ranked beliefs are italicized in Appendix A).

3. Results

3.1. Sample Characteristics

Table 4 presents the distribution of demographic and other background characteristics of the sample. It is worth recalling that weights were assigned within each of the smoking status groups to match the distribution of several of these variables (sex, age, race/ethnicity, education and metropolitan living status) in the NSDUH sample. Thus, the estimates reported here for those variables reflect expected population values. For the behavior analysis, the weighted sample of Never Tobacco Users ($n = 1,049$) differed substantially from the Current Tobacco Users (weighted $n = 337$), especially in the distribution of gender, age, sensation seeking, whether participants lived with a smoker, and whether participants had at least one of four close friends who used tobacco (all differences significant at $p < .01$; Table 4). Although one might also expect to see differences between these groups on education (because educational attainment tends to be negatively associated with smoking status), this was not found. One explanation might be that, among the group of 18 – 25 year old Current Tobacco Users who started smoking cigarettes after 18, there are more Not Daily Tobacco Users than Daily Tobacco Users, and the NSDUH data show that Not Daily Tobacco Users tend to have higher levels of education than Daily Tobacco Users.

3.2. Main Findings

Table 5 presents percentage to gain, odds ratios, and percentage to move values for each of the 20 campaign themes, separately for the intention analysis and the behavior analysis. We found that the median percentage to gain in the intention analysis was 7.8%, ranging from 5.4% to 8.8%. The median percentage to gain in the behavior analysis was 9.6%, ranging from 6.7% to 16.4% (Table 5). Given that all of the percentage to gain values were positive, these findings

Table 4. *Weighted Sample Characteristics for Never Tobacco Users and Current Tobacco Users*

	Behavior Analysis Sample	
	Never Tobacco Users	**Current Tobacco Users**
	(& Intention Analysis Sample)	
	n = 1,049	*n* = 337
	%	*%*
Male	42.8	56.5
Female	57.2	43.5
Age: 18-19	32.8	14.8
Age: 20-21	25.5	25.0
Age: 22-23	21.5	30.9
Age: 24-25	20.2	29.3
White Non-Hispanic	47.5	52.9
Black Non-Hispanic	18.7	16.0
Hispanic	23.1	21.6
Other	10.7	9.5
High School or Less	48.1	50.0
Some College	51.9	50.0
Live in Metro Areas	88.4	86.4
High Sensation Seeker	42.7	58.5
Had A Sibling Who Smoked	17.7	38.0
Lived With A Smoker	27.5	50.9
At Least One of Four Closest Friends Uses Tobacco	37.0	82.2

Note. Due to rounding, percentages may not total to 100.

indicate that on the whole, all of the message themes were somewhat promising. However, as described earlier, because there were strengths and limitations associated with both the intention and behavior analyses, we unified them by standardizing the percentage to gain for both analyses and averaging those estimates. Then, to make the resulting index more accessible we converted these values to a 0-100 scale called the *Relative Promise Index* (Figure 1). The mean percentage to gain value was assigned a 50 on this index. Zero represents values three standard deviations below the mean; 33 represents one standard deviation below the mean; 67 represents one standard deviation above the mean; and 100 represents values three standard deviations above the mean. We then used the Relative Promise Index to identify those message themes that were more promising than others (at least one standard above the mean; ≥ 67) or less promising than others (at least one standard below the mean; ≥ 33).

3.2.1. Campaign Themes Most Relevant to the FDA's Regulatory Authority

We begin by focusing on the six message themes that we identified as being most relevant to the FDA's regulatory authority. On the whole, all of these themes would be likely to have a positive effect if they were used as the basis for a campaign (i.e., all of the percentages to gain and ORs were positive; Table 5). However, of the six themes, the Physical (Health) Effects theme was slightly more promising than the others. Although this theme's value on the Relative Promise Index was not greater than one standard deviation above the mean, it had moderate (intention analysis) and high (behavior analysis) percentages to gain, high odds ratios and moderate percentage to move values in both analyses (Table 5). These results indicate that, compared to the other five FDA-relevant message themes, the Physical (Health) Effects theme would make the most promising target of a campaign to prevent smoking initiation among 18 – 25 year olds.

Conversely, the Harmful Ingredients: Health Effects framing theme, which had very low percentages to gain, moderate odds ratios and low percentages to move, was both the least promising of the six relevant themes and the least promising overall, with a value on the Relative Promise Index of 27 (more than one standard deviation below the mean; Figure 1). The low level of promise of this theme seems to be driven by particularly low percentages to move in both analyses (26% and 33%), indicating that the primary weakness of this theme is that many at risk young adults (i.e., at least 67%) already believe that inhaling the harmful ingredients found in

Table 5. *Message Themes: Relative Promise Index, Percentage to Gain, Scale-Intention Association (Odds Ratio), and Percentage to Move Values (Ordered from Highest to Lowest Relative Promise Index, within Subset)*

	Relative Promise Index	Intention Analysis			Behavior Analysis		
		Percentage to Gain	Odds Ratio	Percentage to Move	Percentage to Gain	Odds Ratio	Percentage to Move
FDA More Relevant							
Physical (Health) Effects	58	7.8%	3.21	34%	12.0%	4.84	43%
Harmful Ingredients: Common Products[a]	49	8.1%	3.24	35%	8.2%	2.75	42%
Youth Susceptibility to Health Effects	48	7.7%	2.78	38%	9.1%	3.05	45%
Physical (Cosmetic) Effects	44	7.1%	2.99	32%	9.1%	3.50	39%
Addiction	39	6.6%	2.75	32%	8.8%	3.29	40%
Harmful Ingredients: Health Effects[a]	27	5.4%	2.68	26%	7.6%	3.62	33%
FDA Less Relevant							
Injunctive Social Norms from Peers	77	8.7%	2.17	62%	16.4%	5.54	69%
Mood Effects	76	8.8%	2.82	44%	16.1%	6.80	54%
Social Perceptions (S)	75	8.7%	2.76	45%	15.9%	6.53	55%
Expression of Independence (S)	65	8.3%	2.52	48%	13.5%	4.49	55%
Self-Efficacy	56	8.4%	6.93	20%	10.2%	5.87	29%
General Social Norms (S)	55	8.1%	1.95	65%	10.3%	2.42	69%
Social Perceptions (NS)	46	7.8%	2.14	55%	8.0%	2.17	59%
Impact on Sports	45	7.5%	2.93	35%	8.5%	2.95	42%
Endangering Others	45	6.9%	2.86	32%	10.0%	3.93	40%

General Social Norms (NS)	44	8.0%	1.91	73%	6.7%	1.66	76%
Peer Pressure from Others	41	5.4%	2.06	38%	12.4%	4.62	47%
Expression of Independence (NS)	37	6.5%	2.15	43%	8.5%	2.68	49%
Injunctive Social Norms from Parents	37	5.4%	1.98	41%	10.9%	3.66	48%
Cost of Smoking	36	6.2%	3.08	27%	8.7%	3.80	34%

Note. $n = 1,049$ for the intention analysis and $n = 1,387$ for the behavior analysis (weighted samples). Relative Promise Index is a standardized value that captures the percentage to gain values from both the intention and behavior analyses. (S) belief items referred to the consequences of smoking; (NS) belief items referred to the consequences of not smoking.

[a] All of the individual beliefs in this set were asked of only half the total sample (e.g., respondents were randomly assigned to receive only one type of Harmful Ingredient item).
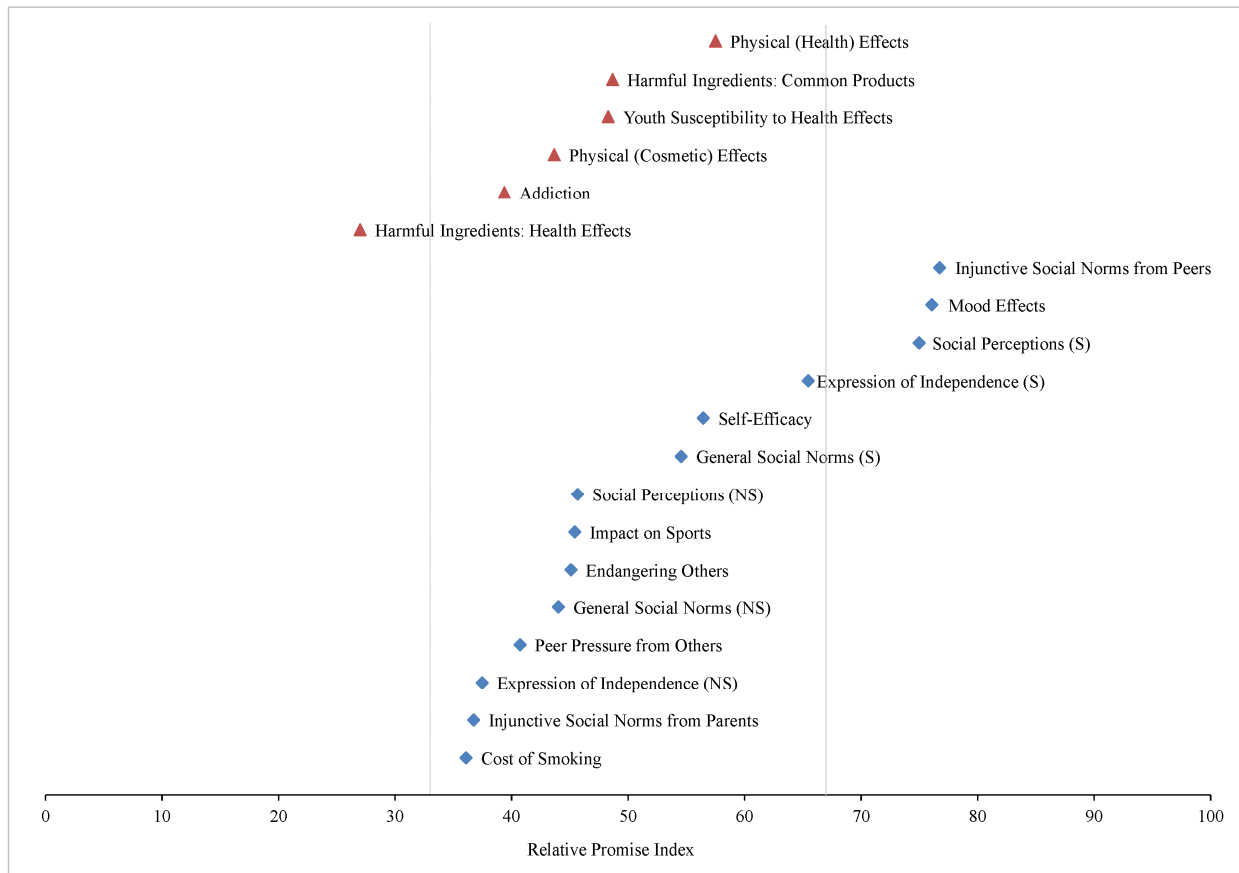
Figure 1. Relative Promise Index values for the 20 message themes. Red triangles next to the theme labels indicate that this theme is one of the six campaign themes most relevant to the FDA's regulatory authority; blue diamonds next to the theme labels indicate that this theme is one of the 14 campaign themes that are less relevant to the FDA's regulatory authority. (S) next to theme labels indicates that the items had a "smoking" framing; (NS) next to labels indicates that the items had a "not smoking" framing. Vertical lines mark one standard deviation below (33) and above (67) the mean.

tobacco products will lead to negative health effects. Thus, because there are not many people available to be influenced by a campaign targeting these beliefs, it is unlikely that such a campaign would have much of an impact. Once again though, because its ORs and percentages to gain in both analyses were positive, there was no evidence that even this relatively unpromising theme would have any detrimental effects.

3.2.2. Other Potential Campaign Themes

Of the remaining 14 campaign themes, three message themes were more promising than the others, with values on the Relative Promise Index that were greater than one standard deviation above the mean: Injunctive Social Norms from Peers; Mood Effects; and Social Perceptions (Smoking). These three scales had high percentages to gain and odds ratios in both analyses, indicating strong associations between these beliefs and intentions/behavior (Table 5).

In the case of the Injunctive Social Norms from Peers theme, these results indicate that a lack of acceptance of smoking among peers is strongly associated with the likelihood that young adults have *no* intention to smoke and have never smoked. However, these findings must be interpreted with some caution, given that the percentages to move for this scale were among the highest observed (62% in the intention analysis; 69% in the behavior analysis), indicating that only around one-third of respondents endorsed these beliefs. Particularly for these injunctive norm beliefs—which measure the extent to which the respondent's friends (and others their age) disapprove of smoking—it is possible that this low level of endorsement reflects respondents' own experiences in the world, such that it is unlikely that a mass media campaign could easily change these beliefs.

Results for the Mood Effects theme indicate that those individuals who believe that smoking is unlikely to have a positive impact on their mood are more likely to have *no* intention to smoke and are more likely to be Never Tobacco Users. Results for the Social Perceptions (Smoking) theme indicate that individuals who believe that smoking is unlikely to help them look attractive, be desirable and gain social capital are also more likely to have *no* intention to smoke and to be a Never Tobacco User than those who do not believe these things. Both of these scales had moderate percentages to move (Table 5), indicating that there's still a substantial proportion of the population who do not yet hold the desired beliefs (i.e., that if they smoke, they will be *very unlikely* to look attractive; be *very unlikely* to feel better when they are sad), and we feel more confident that these types of beliefs could be changed by a campaign message.

The remaining 11 themes all had values on the Relative Promise Index that were within one standard deviation of the mean, indicating that they would all make a moderately, and similarly, promising target of a campaign.

3.3. Additional Findings

3.3.1. Theme Promise by Demographic Sub-Groups

We conducted an additional set of analyses to examine whether the promise of each campaign theme (as measured by percentage to gain) varied by five demographic characteristics: gender (males and females); age (18 – 21 and 22 – 25 year olds); race/ethnicity (non-Hispanic Whites, non-Hispanic Blacks, and Hispanics); education (high school or less and some college); and sensation seeking (low and high). Percentage to gain values for each theme, by each sub-group, are presented in Appendix B (intention analysis) and Appendix C (behavior analysis), along with the results of the significance tests for differences.

In the intention analysis, of the 120 between-group comparisons that we conducted (20 themes by four two-group characteristics [80 comparisons] and one three-group characteristic [40 comparisons]), 12 were statistically significant (10%; Appendix B). However, there were no significant moderation effects for 12 of the 20 themes; only one significant moderation effect for five themes; two significant moderation effects for two themes; and three significant moderation effects for only one theme (Appendix B). Therefore, in general, the campaign themes that are most (least) promising overall are likely to be promising (less promising) at preventing all members of the target audience from having any intention to smoke.

In the behavior analysis, 27 of the 120 between-group comparisons showed evidence of significant moderation (23%; Appendix C). Again, there were no significant moderation effects for eight of the 20 themes; only one significant moderation effect for five themes; two significant moderation effects for two themes; three significant moderation effects for three themes; and four significant moderation effects for only two themes (Appendix C). It is important to note for which groups these differences occurred. Percentage to gain values were moderated by age for nine of the 20 themes, and in each case, there was a higher percentage to gain for older (22 – 25) rather than younger (18 – 21) participants. Percentage to gain values were moderated by

sensation seeking for six of 20 themes (higher values for high rather than low sensation seekers); moderated by sex for five of the 20 themes (higher values for males than for females); moderated by race/ethnicity for only four of the 20 themes (higher values for non-Hispanic Whites than for non-Hispanic Blacks for four themes, and higher for non-Hispanic Whites than for Hispanics for one theme); and they were moderated by educational attainment for only two of the 20 themes (higher values for participants with a lower level of education). Therefore, while all of the campaign themes were at least somewhat promising for all sub-groups (i.e., there were no negative percentages to gain), in general, 22 – 25 year olds, high sensation seekers, males, non-Hispanic Whites, and the less educated showed the greatest potential for being influenced by the campaign themes examined in this study. Notably, these are the groups that tend to have the highest rates of smoking among 18 – 25 year olds (US Department of Health and Human Services, 2012). The current results therefore indicate that although some attention may need to be paid to sub-group differences when selecting the most promising campaign theme, it is unlikely that any of the observed differences will have negative consequences for the impact of the campaign.

3.3.2. Relative Promise of Themes about the Consequences of Smoking and of Not Smoking

Three message themes (Expression of Independence; Social Perceptions; and General Social Norms) were framed in two ways: 1) referencing the consequences of smoking and 2) referencing the consequences of <u>not</u> smoking. In each case, we found that the theme that referred to the consequences of smoking was somewhat more promising than the comparable theme that referred to the consequences of <u>not</u> smoking, and for most of the individual beliefs within these themes, this was also the case. This pattern was particularly pronounced in the behavior analysis (see Figure 1, Table 5, Appendix A). For example, for the Expression of Independence theme, the percentage to gain for the smoking framing was greater than the percentage to gain for the <u>not</u> smoking framing in the intention analysis (8.3% vs. 6.5%) and even more so in the behavior analysis (13.5% vs. 8.5%). In addition, in the intention analysis, two out of three individual Expression of Independence (Smoking) beliefs with the smoking framing had higher percentage to gains than the comparable belief items in the <u>not</u> smoking framing. In the behavior analysis, the percentage to gain value for all three of the individual beliefs was higher with the smoking

framing than with the <u>not</u> smoking framing. Similar patterns were observed for the Social Perceptions and General Social Norms themes.

3.3.3. Relative Promise of Different Social Norms Themes

Smoking-related social norms were represented by four different message themes. Only one of these themes had a high value on the Relative Promise Index: Injunctive Social Norms from Peers (77). The remaining themes had either a moderate (General Social Norms (Smoking), 55) or low (General Social Norms (Not Smoking), 44 and Injunctive Social Norms from Parents, 37) value. These results indicate that the perceived disapproval of smoking among peers (Injunctive Social Norms) among 18 – 25 year olds is likely to make a more promising campaign theme than either the perception that smoking (or not smoking) will make you just like everyone else (General Social Norms). These results also indicate that perceived disapproval of smoking among peers is a more promising theme than perceived disapproval of smoking among parents. As noted earlier though, to the extent that these beliefs reflect respondents' knowledge of the extent to which their peers and parents either do or do not disapprove of smoking, these beliefs may be particularly difficult to change with a mass media campaign.

4. Conclusions

Of the six potential campaign themes that we identified as being relevant to the FDA's regulatory authority, we found that the Physical (Health) Effects theme was the most promising and the Harmful Ingredients: Health Effects framing theme was somewhat less promising than the others. Of the remaining 14 themes, three were somewhat more promising than the others: Mood Effects; Social Perceptions (Smoking); and Injunctive Social Norms from Peers. However, it is important to note that all of the themes showed at least some level of promise. These findings should all be interpreted with a consideration as to how likely it is that a successful campaign could be built around the theme. Attention should be given to the themes (and within the themes, the specific messages [i.e., beliefs]) that will lead to campaigns that elicit negative emotions, can take the form of a narrative/story, present information that is new and is not easily contradicted by real world experiences, and have previously been shown to be effective.

5. References

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US Department of Health and Human Services. (2012). *Preventing tobacco use among youth and young adults: A report of the Surgeon General.* Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Appendix A.

Individual Belief Items: Percentage to Gain, Belief-Intention Association (OR), and Percentage to Move Values from the Intention Analysis & Behavior Analysis (Ordered Within Subset from Highest to Lowest Percentage to Gain, According to Intention Analysis)

Belief items were ranked from highest to lowest percentage to gain, and then grouped into quintiles. In the intention analysis, percentage to gain values in the first (top) quintile ranged from 9.2 – 12.9%, and percentage to gain values in the fifth (bottom) quintile ranged from 1.1 – 6.6%. In the behavior analysis, percentage to gain values in the first quintile ranged from 13.1 – 18.4%, and percentage to gain values in the fifth quintile ranged from 5.1 – 8.5%. In the table, those in the first quintile (within each analysis) are highlighted in bold text and those in the fifth quintile are italicized.

All belief items were asked with the introductory stem "If I smoke every day, I will…", unless otherwise noted with a superscript in the table (superscripts are explained in the notes section at the end of the table). Belief items were coded so that the desired response was "very likely" (the most anti-smoking belief), unless otherwise indicated in parentheses after the belief item.

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
FDA Relevant						
<u>Physical (Health) Effects</u>						
Be able to deal with physical pain (very unlikely)	**11.8**	**4.03**	**46**	11.2	3.80	53
Develop headaches	**11.0**	**3.57**	**48**	12.0	3.45	55
Develop throat cancer	**10.7**	**3.39**	**44**	11.3	3.65	52
Develop a blood clot in my brain	**10.6**	**2.98**	**58**	10.5	2.82	63
Become short of breath	**10.4**	**3.56**	**39**	11.3	3.69	47
Have a burning feeling in my throat	**10.4**	**3.24**	**46**	9.5	2.94	52
Develop sexual and/or fertility problems	**9.8**	**2.53**	**57**	10.3	2.61	62
Develop circulation problems	**9.3**	**3.35**	**41**	13.0	4.70	49
Develop diseases in my toes and fingers	9.1	2.82	54	13.0	3.74	60
Keep myself from overeating (very unlikely)	9.1	2.46	51	10.7	2.84	58
Develop heart disease	8.7	2.55	47	9.8	2.83	53
Clog my arteries	8.4	2.39	48	11.5	3.37	55
Need chemotherapy and radiation	8.3	2.22	56	**13.2**	**3.60**	**62**
Develop bad coughs and phlegm	8.2	3.33	34	11.4	4.43	42
Destroy my brain cells	8.1	2.63	43	9.5	2.93	49
Get sick more easily	8.0	2.63	42	9.1	2.92	49
Have difficulty concentrating	7.8	2.30	50	11.1	3.18	57
Be able to focus (very unlikely)	7.5	2.39	45	**15.5**	**6.00**	**55**
Stunt my growth	7.4	1.91	59	9.1	2.34	64
Suffer a stroke	7.2	1.94	54	12.9	4.03	60
Develop lung cancer	7.0	2.51	41	10.4	3.29	48

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Lose my taste buds	7.0	2.15	49	11.5	3.12	56
Harm my health	6.9	4.11	24	*7.1*	*3.36*	*30*
Develop cancer	6.9	2.46	40	*8.3*	*2.83*	*46*
Die an early death	6.9	2.39	43	*8.5*	*2.59*	*49*
Damage my body	6.8	3.56	28	8.9	3.65	36
Develop inflammation in my lungs	*6.6*	*2.70*	*34*	**13.4**	**5.49**	**44**
Have a soothing feeling in my throat (very unlikely)	*6.3*	*2.38*	*38*	12.2	4.11	47
Develop fatal lung disease	*5.7*	*1.96*	*42*	8.0	2.67	47
Develop high blood pressure	*5.3*	*1.95*	*45*	11.5	3.66	53
Develop mouth cancer	*4.7*	*1.70*	*46*	11.1	3.25	53
Harmful Ingredients: Common Products Framing						
Inhale nickel, which is also found in stainless steel	**9.8**	**3.02**	**49**	10.7	2.87	55
Inhale ammonia, which is also found in many household cleaners	8.6	2.73	46	10.5	2.95	53
Inhale benzene, which is also found in some types of detergents	8.5	2.66	47	11.3	3.13	54
Inhale formaldehyde, which is also found in glues and adhesives	8.5	2.70	46	8.6	2.41	52
Inhale lead, which is also found in some paints	8.4	2.62	47	11.4	3.18	54
Inhale carbon monoxide, which is also found in car exhaust	8.3	2.81	43	*8.1*	*2.41*	*48*
Inhale nicotine	8.2	3.82	31	*6.3*	*2.37*	*36*
Inhale acetone, which is also found in nail polish remover	7.8	2.35	50	9.9	2.64	56
Inhale arsenic, which is also found in car batteries	7.6	2.45	46	10.6	2.97	53
Inhale mercury, which is also found in mascara	7.6	2.28	50	11.1	2.98	56
Inhale chemicals	7.2	3.04	33	*8.4*	*2.93*	*40*
Inhale poisons	7.2	2.87	35	10.2	3.42	43

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Inhale tar, which is also used to pave roads and driveways	7.1	2.53	40	8.9	2.71	46
Youth Susceptibility to Health Effects						
If I smoke every day, I am just as likely to harm my health as an older person who smokes every day (strongly agree)[a]	9.1	3.00	43	8.9	2.76	49
People my age who smoke every day are just as likely to harm their health as older people who smoke every day (strongly agree)[a]	8.8	2.88	43	9.1	2.83	49
Be just as likely to damage my body as an adult smoker would	7.3	2.87	33	12.7	5.07	43
Physical (Cosmetic) Effects						
Develop brittle hair	**12.0**	**3.48**	**53**	10.6	2.86	59
Look gross	**9.7**	**3.56**	**42**	11.2	3.55	50
Have a bad taste in my mouth	**9.5**	**3.72**	**36**	10.7	4.18	44
Get yellow fingers	8.5	2.47	51	10.6	3.09	57
Get bad breath	8.4	4.27	29	9.4	3.94	37
Develop uneven skin coloring	8.1	2.45	47	11.5	3.51	54
Get wrinkles	7.9	2.54	47	9.6	2.91	53
Get yellow teeth	7.9	3.14	33	*7.5*	*2.76*	*39*
Have a smelly home	7.3	2.98	34	10.8	4.41	42
Have smelly hair and clothes	*6.0*	*3.09*	*26*	9.8	4.26	35
Addiction						
Eventually need to smoke even more	**9.7**	**3.78**	**38**	8.7	3.01	44
Be controlled by smoking	8.4	2.98	44	8.7	2.61	50
Become addicted to nicotine	7.0	3.11	30	9.1	3.76	38
Become addicted to cigarettes	*5.4*	*2.37*	*31*	9.8	4.05	39

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Be unable to stop smoking when I want to	*5.3*	*1.86*	*42*	**13.1**	**4.77**	**50**
Harmful Ingredients: Health Effects Framing						
Inhale nickel, which makes it hard to breathe	8.9	2.82	44	9.3	3.15	50
Inhale ammonia, which harms the lungs	8.2	2.92	38	*7.8*	*2.87*	*44*
Inhale mercury, which causes cancer	7.7	2.61	41	9.1	3.22	47
Inhale carbon monoxide, which causes sexual and/or fertility problems	7.5	2.58	40	9.5	3.47	46
Inhale arsenic, which damages the heart	7.3	2.55	39	9.6	3.50	46
Inhale acetone, which makes it hard to breathe	7.3	2.59	38	10.4	4.04	45
Inhale lead, which causes cancer	6.6	2.38	38	10.6	4.12	45
Inhale nicotine, which causes addiction	6.6	2.84	30	8.7	3.77	37
Inhale benzene, which damages the heart	*6.6*	*2.30*	*39*	10.5	3.94	46
Inhale poisons that damage the body	*6.4*	*2.68*	*32*	9.3	3.94	39
Inhale formaldehyde, which harms the lungs	*5.9*	*2.27*	*36*	*7.2*	*2.72*	*41*
Inhale tar, which causes lung cancer	*5.6*	*2.37*	*31*	8.9	3.87	38
Inhale chemicals that damage the body	*5.5*	*2.38*	*31*	10.0	4.43	39
FDA Less Relevant						
Injunctive Social Norms from Peers						
My friends will disapprove	**10.4**	**2.95**	**52**	13.0	3.77	59
My friends will accept it (very unlikely)	**9.5**	**2.67**	**52**	**15.2**	**5.82**	**60**
My friends won't care about it (very unlikely)	7.9	2.18	59	**15.0**	**4.22**	**66**
Others my age will accept it (very unlikely)	7.7	2.13	55	**14.9**	**4.61**	**63**
Others my age will disapprove	7.1	1.96	59	**13.9**	**4.13**	**66**
Others my age won't care about it (very unlikely)	*5.2*	*1.49*	*69*	**17.1**	**5.19**	**74**

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Mood Effects						
Feel more comfortable in social situations (very unlikely)	**11.8**	**4.49**	**45**	13.1	4.22	53
Be able to forget about my problems (very unlikely)	**11.3**	**3.42**	**47**	9.6	2.93	53
Feel better when I am sad (very unlikely)	**10.8**	**3.08**	**49**	**14.8**	**4.72**	**57**
Be able to control my anger (very unlikely)	**10.6**	**3.23**	**49**	**15.5**	**5.79**	**57**
Enjoy life more (very unlikely)	**9.9**	**3.93**	**36**	**13.5**	**5.04**	**46**
Feel less cranky (very unlikely)	8.7	2.69	47	**15.0**	**5.99**	**56**
Feel content (very unlikely)	8.4	2.74	43	**15.2**	**5.33**	**53**
Feel relaxed (very unlikely)	7.2	2.29	49	**17.0**	**7.49**	**58**
Have something to do with my hands (very unlikely)	7.0	1.96	55	**16.7**	**5.90**	**63**
Feel less bored (very unlikely)	*6.3*	*2.06*	*46*	11.6	4.00	53
Social Perceptions (Smoking)						
Be sexually/romantically undesirable	**12.9**	**3.82**	**55**	12.3	3.51	61
Look uncool	**10.3**	**2.96**	**52**	**14.9**	**5.02**	**60**
Look stupid	**9.8**	**2.91**	**46**	**13.5**	**4.97**	**54**
Gain friends (very unlikely)	**9.7**	**2.54**	**55**	10.8	2.92	60
Not look confident	**9.4**	**2.43**	**58**	12.0	3.22	64
Look mature (very unlikely)	**9.2**	**3.17**	**40**	12.8	5.35	48
Lose respect from others my age	9.0	2.38	56	**16.0**	**5.52**	**64**
Be sexually/romantically appealing (very unlikely)	8.9	3.65	38	**13.7**	**5.39**	**47**
Be able to show others that I'm not afraid to take risks (very unlikely)	8.6	2.38	55	11.6	3.18	61
Be popular (very unlikely)	8.4	2.67	48	*8.0*	*2.33*	*53*
Be unable to go to places that don't allow smoking	8.2	2.59	43	**14.4**	**5.91**	**52**

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Look unattractive	8.2	2.40	46	**14.7**	**5.34**	**55**
Look attractive (very unlikely)	8.2	3.34	36	11.6	4.47	44
Look immature	8.1	2.25	53	**14.4**	**5.43**	**60**
Get respect from others my age (very unlikely)	8.0	2.51	43	11.4	3.51	51
Look confident (very unlikely)	8.0	2.51	44	12.2	3.84	52
Gain respect from my brother(s) and/or sister(s) (very unlikely)	7.7	3.41	30	9.7	4.05	38
Look intelligent (very unlikely)	7.3	2.97	33	11.1	4.62	42
Lose friends	7.1	1.90	60	**15.2**	**5.07**	**67**
Look ridiculous	7.1	2.27	47	**15.3**	**5.41**	**56**
Look cool (very unlikely)	6.6	2.61	38	10.1	3.45	46
Be unpopular	6.6	1.72	67	**13.8**	**3.40**	**72**
Lose respect from my brother(s) and/or sister(s)	*5.1*	*1.76*	*46*	**14.4**	**5.22**	**54**
Expression of Independence (Smoking)						
Show that I am independent (very unlikely)	9.1	3.17	43	12.2	4.08	51
Be making my own decisions (very unlikely)	7.9	2.19	52	**14.2**	**5.86**	**60**
Have control over my life (very unlikely)	6.9	2.30	42	**16.6**	**6.84**	**53**
Self-Efficacy						
How sure are you that, if you really wanted to, you could say no to a cigarette offer if a very close friend offers it? (completely sure)[b]	**9.5**	**7.36**	**22**	11.2	6.16	32
How sure are you that, if you really wanted to, you could say no to a cigarette offer if you are at a party where most people are smoking? (completely sure)[b]	9.0	7.12	21	11.6	6.71	32
How sure are you that, if you really wanted to, you could say no to a cigarette offer if someone you know offers it? (completely sure)[b]	8.8	7.11	21	9.8	5.33	30
General Social Norms (Smoking)						

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Be more like everyone else (very unlikely)	**9.5**	**2.43**	**58**	12.0	3.06	64
Be doing what most others my age are doing (very unlikely)	8.5	1.88	72	9.3	2.14	75
Social Perceptions (Not Smoking)						
Be popular[c]	**10.3**	**2.30**	**73**	*7.6*	*1.79*	*76*
Look cool[c]	**10.0**	**2.27**	**68**	*6.6*	*1.80*	*71*
Be sexually/romantically appealing[c]	**9.7**	**2.72**	**58**	*8.1*	*2.07*	*62*
Look confident[c]	9.0	2.31	57	*7.1*	*1.93*	*61*
Gain friends[c]	9.0	2.05	68	*5.9*	*1.59*	*71*
Get respect from others my age[c]	8.0	2.04	61	*5.7*	*1.75*	*64*
Look mature[c]	7.3	2.01	55	*8.4*	*2.36*	*60*
Look attractive[c]	7.1	1.96	56	*7.0*	*1.96*	*59*
Gain respect from my brother(s) and/or sister(s)[c]	*6.0*	*1.98*	*45*	9.8	2.94	51
Look intelligent[c]	*5.6*	*1.84*	*53*	10.2	2.75	58
Impact on Sports						
Do poorly in sports	**10.2**	**3.52**	**44**	11.1	3.29	51
Have less energy to play sports	7.3	2.63	39	8.8	2.96	45
Lose my breath easily while playing sports	*5.8*	*2.44*	*32*	10.2	3.84	40
Endangering Others						
Harm my friends and family through second-hand smoke	9.1	3.51	35	8.6	3.18	42
Harm my future children	7.3	2.50	38	11.7	4.28	47
Harm children through second-hand smoke	*6.2*	*2.28*	*38*	**13.2**	**5.42**	**47**
Harm nonsmokers through second-hand smoke	*5.1*	*2.24*	*30*	11.5	5.12	39
General Social Norms (Not Smoking)						

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Be doing what most others my age are doing[c]	**12.4**	**2.84**	**72**	*7.1*	*1.69*	*75*
Be more like everyone else[c]	*5.0*	*1.47*	*75*	10.0	2.14	78
Peer Pressure from Others						
Do others your age encourage you to smoke? (never)[d]	*6.0*	*2.03*	*44*	*7.5*	*2.36*	*49*
Do your friends offer you a smoke? (never)[d]	*4.7*	*1.83*	*40*	**14.4**	**5.82**	**50**
Expression of Independence (Not Smoking)						
Have control over my life every day[c]	7.9	2.56	41	*7.4*	*2.44*	*47*
Be showing that I am independent[c]	7.8	2.20	53	*7.6*	*2.21*	*57*
Be making my own decisions[c]	7.6	2.69	37	11.2	4.14	45
Injunctive Social Norms from Parents						
My parent(s)/guardian(s) will disapprove	7.0	2.81	33	9.5	3.45	41
My parent(s)/guardian(s) will be upset	*5.1*	*2.25*	*33*	10.8	4.77	41
Get in trouble with my parent(s)/guardian(s)	*1.1*	*1.11*	*54*	**15.3**	**5.43**	**62**
Cost of Smoking						
Spend thousands of dollars on tobacco products over my lifetime	8.5	3.82	32	*7.9*	*3.04*	*38*
Spend hundreds of dollars on tobacco products a year	7.1	3.25	30	*8.5*	*3.52*	*37*
Have less spending money	6.5	2.94	30	8.5	3.39	37
Waste money I could have spent on other things	*5.3*	*2.79*	*25*	*7.3*	*3.27*	*31*
Spend more money on doctor and dentist visits	*5.2*	*2.13*	*35*	11.8	4.64	44
Individual Belief Items (not included in any scale)						
Lose my appetite (very unlikely)	8.7	1.94	82	*5.7*	*1.51*	*83*
Have you tried to convince your friends not to smoke (almost always)[e]	8.2	1.75	84	*5.1*	*1.42*	*85*
Lose weight (very unlikely)	8.1	1.86	72	*5.4*	*1.52*	*73*

	Intention Analysis			Behavior Analysis		
Belief Items (within themes)	**Percentage to Gain (%)**	**Odds Ratio**	**Percentage to Move (%)**	**Percentage to Gain (%)**	**Odds Ratio**	**Percentage to Move (%)**
Develop a scratchy voice	8.1	2.13	59	10.5	2.83	64
My parent(s)/guardian(s) won't care about it	7.6	3.10	35	12.5	4.75	45
Get a buzz (very unlikely)	6.8	1.67	71	*6.0*	*1.66*	*73*
Have a pleasant taste in my mouth (very unlikely)	6.6	3.29	26	11.3	5.26	36
How often do your brother(s) and/or sister(s) smoke around you (never)	*6.2*	*1.49*	*77*	**18.4**	**2.81**	**83**
Constantly think about smoking	*3.9*	*1.36*	65	*6.7*	*1.80*	68
Influence my brother or sister to smoke	*1.6*	*1.11*	80	12.4	2.74	83

Note. In order to learn about a large number of beliefs we randomly assigned participants to see sub-sets of beliefs, leading to variations in the number of respondents who provided valid data for each scale. In this table, bolded values indicate that this belief was ranked in the top quintile (of all 164 beliefs; within analysis); and italicized values indicate that this belief was ranked in the bottom quintile (of all 164 beliefs; within analysis).

[a] Respondents were asked whether they agreed or disagreed with these statements (with response options on a 5-point scale ranging from *strongly disagree* to *strongly agree*). These items did *not* begin with the "If I smoke every day, I will" stem but rather were stated exactly as written. For each of these beliefs, the desired response option was *strongly agree*.

[b] Respondents were asked to rate how sure they were to these three items (with response options on a 5-point scale ranging from *not at all sure* to *completely sure*). These items did *not* begin with the "If I smoke every day, I will" stem but rather were stated exactly as written. For each of these beliefs, the desired response option was *completely sure*.

[c] The only difference with these items is that they began with the introductory stem "If I do not smoke at all, I will…". The desired response here was *very likely*.

[d] Respondents were asked how frequently these events happened (with response options on a 5-point scale ranging from *never* to *almost always*). These items did *not* begin with the "If I smoke every day, I will" stem but rather were stated exactly as written. For each of these belief items, they were coded with the desired response of *never*.

[e] Respondents were asked how frequently this happened (with response options on a five-point scale ranging from *never* to *almost always*). This item did not begin with the "If I smoke every day, I will" stem but rather was stated exactly as written. For this belief item, the desired response option was *almost always*.

Appendix B. *Sub-Group Differences in Percentage to Gain Estimates for each Message Theme in the <u>Intention Analysis</u>*

	Overall N=1049	Male n=449	Female n=600	18-21 year olds n=612	22-25 year olds n=437	White (ref) n=498	Black n=196	Hispanic n=243	High school or less n=505	Some college n=544	Low Sensation Seekers n=601	High Sensation Seekers n=448
FDA Relevant												
Physical (Health) Effects	7.8%	8.6%	6.6%	8.2%	7.2%	**5.0%**	7.9%	**14.3%**	9.6%	6.0%	7.9%	8.0%
Harmful Ingredients: Common Products [a]	8.1%	11.2%	5.3%	7.8%	8.4%	5.1%	10.0%	9.0%	10.4%	5.8%	6.8%	10.2%
Youth Susceptibility to Health Effects	7.7%	**12.4%**	**4.2%**	6.0%	10.2%	7.4%	2.4%	11.7%	9.4%	6.1%	7.6%	7.7%
Physical (Cosmetic) Effects	7.1%	8.5%	5.3%	6.5%	7.8%	4.8%	8.8%	10.6%	**9.6%**	**4.6%**	7.2%	7.2%
Addiction	6.6%	8.4%	5.0%	5.6%	7.8%	4.8%	6.0%	9.3%	7.3%	6.0%	6.4%	7.3%
Harmful Ingredients: Health Effects [a]	5.4%	7.0%	3.9%	4.5%	6.6%	2.5%	8.7%	10.0%	7.4%	3.2%	6.2%	5.0%
FDA Less Relevant												
Injunctive Social Norms from Peers	8.7%	11.7%	6.2%	9.7%	7.3%	7.7%	16.4%	-0.4%	12.3%	5.4%	7.4%	9.9%
Mood Effects	8.8%	**11.8%**	**6.2%**	8.7%	8.7%	8.2%	7.2%	11.7%	8.8%	8.4%	**5.8%**	**12.5%**
Social Perceptions (S)	8.7%	9.4%	7.5%	9.5%	7.6%	7.5%	10.1%	8.7%	10.7%	6.6%	8.0%	9.3%
Expression of Independence (S)	8.3%	9.6%	7.0%	9.3%	6.9%	8.6%	9.2%	6.0%	9.2%	7.2%	6.1%	11.1%
Self-Efficacy	8.4%	**13.9%**	**4.3%**	8.9%	7.6%	**6.5%**	10.3%	**11.5%**	**11.3%**	**5.5%**	8.7%	8.2%
General Social Norms (S)	8.1%	7.4%	8.4%	6.1%	10.3%	9.4%	9.1%	0.3%	8.2%	7.3%	7.8%	8.2%
Social Perceptions (NS)	7.8%	**11.9%**	**4.7%**	7.6%	8.1%	5.8%	13.4%	8.8%	9.8%	5.7%	9.6%	4.8%
Impact on Sports	7.5%	10.3%	5.3%	8.1%	6.7%	5.7%	8.3%	10.4%	9.8%	5.3%	7.3%	8.1%
Endangering Others	6.9%	**9.9%**	**4.4%**	6.6%	7.3%	5.1%	6.4%	10.1%	**9.4%**	**4.6%**	6.3%	7.8%
General Social Norms (NS)	8.0%	11.5%	5.6%	8.8%	7.4%	8.5%	11.7%	3.9%	12.6%	3.6%	9.3%	6.7%
Peer Pressure from Others	5.4%	6.3%	4.2%	4.8%	6.0%	4.2%	10.0%	2.9%	6.0%	4.8%	5.1%	4.7%
Expression of Independence (NS)	6.5%	9.1%	4.4%	5.8%	7.5%	5.0%	9.1%	7.2%	7.8%	5.1%	7.8%	5.3%
Injunctive Social Norms from Parents	5.4%	8.1%	3.1%	4.8%	6.8%	4.6%	4.9%	8.0%	5.4%	5.0%	3.9%	7.8%
Cost of Smoking	6.2%	7.9%	4.6%	5.0%	7.8%	4.2%	6.0%	8.7%	**8.9%**	**3.6%**	6.2%	6.6%

Note. Bold text indicates that the scale percentage to gain estimates for different levels of a moderator are significantly different (*p* < .05). White respondents were non-Hispanic White, and Black respondents were non-Hispanic Black. A fourth group of respondents (*n* = 112) were categorized into an "other" race/ethnicity group, but due to the small sample size and difficulty in interpreting findings for this group, the results are not reported. S = consequences of smoking framing; NS = consequences of not smoking framing. S = consequences of smoking framing; NS = consequences of not smoking framing.

[a] All of the individual beliefs in the Harmful Ingredient sets were asked of only half the total sample.

Appendix C. *Sub-Group Differences in Percentage to Gain Estimates for each Message Theme in the <u>Behavior Analysis</u>*

	Overall $N=1386$	Male $n=639$	Female $n=747$	18-21 year olds $n=746$	22-25 year olds $n=640$	White (ref) $n=676$	Black $n=250$	Hispanic $n=315$	High school or less $n=674$	Some college $n=713$	Low Sensation Seekers $n=741$	High Sensation Seekers $n=645$
FDA Relevant												
Physical (Health) Effects	12.0%	**14.1%**	**9.3%**	**7.9%**	**16.5%**	13.7%	11.3%	9.1%	**14.6%**	**9.8%**	10.6%	13.6%
Harmful Ingredients: Common Products[a]	8.2%	4.3%	9.5%	6.9%	9.7%	9.8%	13.4%	4.4%	**13.8%**	**3.6%**	10.2%	6.5%
Youth Susceptibility to Health Effects	9.1%	9.9%	7.2%	8.1%	9.8%	10.1%	9.1%	9.3%	11.0%	7.3%	9.1%	8.9%
Physical (Cosmetic) Effects	9.1%	9.4%	7.7%	7.5%	10.7%	11.2%	5.5%	7.5%	10.4%	8.0%	9.4%	9.0%
Addiction	8.8%	8.5%	8.4%	**6.3%**	**11.5%**	9.9%	10.8%	5.7%	9.3%	8.4%	9.6%	8.4%
Harmful Ingredients: Health Effects[a]	7.6%	8.7%	6.1%	5.8%	9.6%	7.1%	11.9%	1.8%	6.4%	8.5%	8.4%	7.4%
FDA Less Relevant												
Injunctive Social Norms from Peers	16.4%	**21.3%**	**12.2%**	**12.5%**	**20.8%**	**21.2%**	**9.9%**	**10.2%**	15.7%	16.9%	**12.9%**	**19.9%**
Mood Effects	16.1%	18.2%	13.4%	**11.2%**	**21.5%**	**19.8%**	**9.7%**	13.8%	17.1%	15.1%	**12.7%**	**19.2%**
Social Perceptions (S)	15.9%	**19.5%**	**12.3%**	**12.5%**	**19.4%**	**19.1%**	**8.9%**	12.9%	15.8%	15.9%	**12.8%**	**18.9%**
Expression of Independence (S)	13.5%	**18.0%**	**9.4%**	11.2%	16.0%	**17.4%**	**5.6%**	11.4%	12.5%	14.3%	**10.1%**	**17.0%**
Self-Efficacy	10.2%	11.4%	8.6%	**5.8%**	**15.2%**	11.9%	7.8%	8.1%	11.4%	9.3%	9.1%	11.5%
General Social Norms (S)	10.3%	13.4%	7.2%	7.5%	13.8%	11.9%	4.6%	12.0%	8.7%	11.2%	**5.9%**	**15.0%**
Social Perceptions (NS)	8.0%	9.2%	6.8%	6.2%	9.5%	10.3%	4.8%	4.3%	6.1%	9.5%	6.8%	8.8%
Impact on Sports	8.5%	10.1%	6.5%	6.6%	10.7%	9.3%	9.0%	7.6%	9.0%	8.0%	9.1%	8.2%
Endangering Others	10.0%	**12.2%**	**7.5%**	**6.7%**	**13.6%**	12.6%	7.5%	7.4%	11.1%	9.1%	9.8%	10.2%
General Social Norms (NS)	6.7%	8.6%	5.3%	4.8%	7.9%	8.6%	15.0%	-2.3%	5.4%	7.8%	6.7%	6.9%
Peer Pressure from Others	12.4%	13.2%	10.9%	**8.3%**	**17.1%**	13.6%	11.3%	10.6%	10.4%	14.4%	**8.0%**	**17.1%**
Expression of Independence (NS)	8.5%	10.3%	6.6%	7.3%	9.4%	9.7%	6.4%	7.5%	7.4%	9.5%	6.4%	11.0%
Injunctive Social Norms from Parents	10.9%	11.7%	9.4%	8.3%	12.8%	12.6%	7.1%	10.0%	13.7%	8.7%	11.6%	10.8%
Cost of Smoking	8.7%	10.0%	6.8%	**6.0%**	**11.7%**	9.2%	9.0%	8.2%	10.2%	7.4%	7.6%	10.1%

Note. Bold text indicates that the scale percentage to gain estimates for different levels of a moderator are significantly different ($p < .05$). White respondents were non-Hispanic White, and Black respondents were non-Hispanic Black. A fourth group of respondents ($n = 144$) were categorized into an "other" race/ethnicity group, but due to the small sample size and difficulty in interpreting findings for this group, the results are not reported. S = consequences of smoking framing; NS = consequences of not smoking framing.

[a] All of the individual beliefs in the Harmful Ingredient sets were asked of only half the total sample.