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Brennan, E., Gibson, L., Liu, J., & Hornik, R. C. (2013). Identifying potential target beliefs for a mass media campaign aimed at preventing progression to daily tobacco use: Final findings and recommendations for 18 – 25 year old non-daily tobacco users. (CECCR Working Paper Series). Philadelphia, PA: Penn's Center of Excellence in Cancer Communication Research, Annenberg School for Communication, University of Pennsylvania.

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Health Communication

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Identifying potential target beliefs for a mass media campaign aimed at <u>preventing progression</u> to daily tobacco use: Final findings and recommendations for 18 – 25 year old non-daily tobacco users

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November 2013

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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 stopping smoking progression among 18 – 25 year olds who are intermittent tobacco users. 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 progression to daily tobacco use among 18 – 25 year olds.[1] According to theories of behavioral prediction (e.g., the Theory of Reasoned Action; Fishbein & Ajzen, 2010), reductions in tobacco use progression are likely to be achieved by reducing the number of intermittent tobacco users (who do not currently use tobacco every day) who have some openness (i.e., intentions) to use tobacco daily; and reductions in the number of intermittent tobacco users who intend to use tobacco daily are likely to be achieved by increasing endorsement of the smoking-related beliefs that are most strongly associated with having *no* intention to use tobacco daily. As such, the target audience of these campaign messages is assumed to be intermittent tobacco users who have *some* intention to use tobacco daily, with the expectation that the messages will reduce that intention and also the likelihood of subsequent progression to daily tobacco use. In order to identify the most promising message themes (sets of beliefs), and within each theme, specific messages (beliefs), to be targeted in a stop progression campaign, we conducted two parallel, but distinct analyses.

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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 initiation 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).

In the first set of analyses, intentions were used as the outcome variable (i.e., *some* intention vs. *no* intention to smoke daily). The *intention analysis* compared the rate of endorsement of beliefs among intermittent smokers with *no* intention to smoke daily with that of intermittent smokers who have *some* intention to smoke daily. In the second set of analyses, smoking status was the outcome variable (i.e., *intermittent* tobacco users vs. *daily* tobacco users). The *behavior analysis* compared the rate of belief endorsement by intermittent tobacco users and daily tobacco users, and therefore went some way to identifying the beliefs that may distinguish those who did and did not currently use tobacco every day.

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., intermittent smokers who have *some* intention to smoke daily) to the beliefs held by the group whose status is the goal—intermittent smokers with *no* intention to smoke daily. 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 intermittent smokers will progress to daily 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 (non-daily tobacco use and daily tobacco use) occurred before the measurement of the beliefs; therefore, we cannot be sure that the measured beliefs were actually in place before the prior frequency of tobacco use. 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 intermittent smokers (whose beliefs could not have been impacted by current daily smoking). 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 four 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 Not Daily Cigarette Smokers, defined as those who had smoked cigarettes in the past 30 days but not every day. We compared the smoking-related beliefs held by those who had *no* intention to smoke cigarettes daily to those who had *some* intention to smoke cigarettes daily. We limited the intention analysis to those who *smoked cigarettes* intermittently (rather than *using tobacco* intermittently), because the intention items specifically referred to *smoking cigarettes* daily. The unweighted sample size for the intention analysis was

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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.

512 Not Daily Cigarette Smokers, and because some respondents had missing data on the variables used for weighting, the weighted sample size was 497 Not Daily Cigarette Smokers.

For the *behavior analysis*, we compared the smoking-related beliefs held by Not Daily Tobacco Users, defined as those who had used cigarettes or other smoked or smokeless tobacco products in the past 30 days, but not every day, with beliefs held by Daily Tobacco Users, defined as those who had used cigarettes or other smoked or smokeless tobacco products (at least one type) every day in the past 30 days. The original sample size ($n = 1,228$) for the behavior analysis included 670 Not Daily Tobacco Users (55%) and 558 Daily Tobacco Users (45%). After weighting, the sample size for the behavior analysis was 1,188 (Not Daily Tobacco Users = 650; Daily Tobacco Users = 538).

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 smoke cigarettes daily using the question "How likely is it that you will be smoking **every day** one year from now?". The question was measured using a five-point scale (*very unlikely*; *unlikely*; *neither likely nor unlikely*; *likely*; *very likely*). We then created a dichotomous measure of **no intention to smoke cigarettes daily**, which compared respondents who answered *very unlikely* with all others. One-third (33%) of 18 – 25 year old Not Daily Cigarette Smokers had *no* intention to be smoking cigarettes daily one year from now. Note that although we measured use of tobacco products other than cigarettes, we did not measure specific intentions regarding the frequency of future use of other tobacco products. It is for this reason only that the *intention analysis* includes only Not Daily Cigarette Smokers, while the *behavior analysis* sample also includes users of other tobacco products (Not Daily Tobacco Users and Daily Tobacco Users).

2.4.1.2. Behavior Analysis

For the behavior analysis, we compared two groups based on their smoking status: Not Daily Tobacco Users and Daily Tobacco Users. We identified Not Daily Tobacco Users and Daily Tobacco Users using three questions: 1) "During the past 30 days, on how many days did you smoke cigarettes?"; 2) "During the past 30 days, on how many days did you smoke any form of tobacco products other than cigarettes (e.g., cigars, water pipe, cigarillos, little cigars, pipe)?"; and 3) "During the past 30 days, on how many days did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, dip)?". These questions were measured using a six-point scale (*1 or 2 days; 3 to 5 days; 6 to 9 days; 10 to 19 days; 20 to 29 days; every day*). We then created a dichotomous measure of smoking status, which grouped together those who did *not* respond *every day* to any of the three questions (Not Daily Tobacco Users), and compared them to those who responded *every day* to at least one of the three questions (Daily 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

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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 for each message theme, 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 scale 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

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	1163	5	.84
Harmful Ingredients: Common Products	593[a]	13	.97
Harmful Ingredients: Health Effects	595[a]	13	.96
Physical (Cosmetic) Effects	1188	10	.92
Physical (Health) Effects	1188	31	.96
Youth Susceptibility to Health Effects	1188	3	.79
FDA Less Relevant			
Cost of Smoking	1159	5	.87
Endangering Others	1126	4	.91
Expression of Independence (Smoking)	1061	3	.81
Expression of Independence (Not Smoking)	1088	3	.87
General Social Norms (Smoking)	951	2	.66[b]
General Social Norms (Not Smoking)	962	2	.67[b]
Impact on Sports	1060	3	.86
Injunctive Social Norms from Parents	1050	3	.82
Injunctive Social Norms from Peers	1170	6	.77
Mood Effects	1188	10	.92
Peer Pressure from Others	1188	2	.53[b]
Self-Efficacy	1188	3	.93
Social Perceptions (Smoking)	1188	23	.90
Social Perceptions (Not Smoking)	1188	10	.95

Note. Data from the analytic sample used in the *behavior analysis,* which includes *n*=650 Not Daily Tobacco Users and *n*=538 Daily 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.

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 daily or to be Not Daily 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 daily or to be Not Daily 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 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 smoke cigarettes daily 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, 31.9% of the respondents that were asked this question had no intention to smoke cigarettes daily. But of those who gave the desired response of "*very unlikely* I will feel more comfortable in social situations", 61.9% had no intention to smoke cigarettes daily. If the proportion of the sample endorsing the belief could be increased to 100%, then it is estimated that an *additional* 30.0% of the population would have no intention to smoke cigarettes daily. That is, the potential percentage to gain (under the best case scenario) is 30.0% (61.9% - 31.9% = 30.0%). 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.

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

(*n* = 244)	If I smoke every day, I will feel more comfortable in social situations		
Intention	All others	<u>Very unlikely</u>	Overall
All others	74.9%	38.1%	68.1
No intention to smoke cigarettes daily	25.2%	**61.9%**	**31.9%**
% in column	81.6%	18.4%	100%

Percentage to gain: 61.9% - 31.9% = 30.0%

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

(*n* = 592)	If I smoke every day, I will feel more comfortable in social situations		
Behavior	All others	Very unlikely	Overall
Daily Tobacco Users	46.4%	34.9%	44.3%
Not Daily Tobacco Users	53.6%	**65.1%**	**55.7%**
% in column	81.8%	18.2%	100%

Percentage to gain: 65.1% - 55.7% = 9.4%

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, 55.7% of the respondents that were asked this question were Not Daily Tobacco Users. But of those who gave the desired response of "*very unlikely* I will feel more comfortable in social situations", 65.1% were Not Daily Tobacco Users. If the proportion of the sample endorsing the belief had been increased to 100%, then it is estimated that an *additional* 9.4% of the population would be Not Daily Tobacco Users. That is, the potential percentage to gain (under the best case scenario) is 9.4% (65.1% - 55.7% = 9.4%).

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 $r = .99$ 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 samples, separately for the sample used in the *intention analysis* (Not Daily Cigarette Smokers) and the *behavior analysis* (Not Daily and Daily Tobacco Users). It is worth recalling that weights were assigned within each of the smoking status groups to match the distribution of several of

Table 4. *Weighted Sample Characteristics for Not Daily Cigarette Smokers and All Current Tobacco Users*

	Intention Analysis	Behavior Analysis	
	Not Daily Cigarette Smokers	Not Daily Tobacco Users	Daily Tobacco Users
	$n = 497$	$n = 650$	$n = 538$
	%	%	%
Male	58.9	65.2	59.6
Female	41.1	34.8	40.4
Age: 18-19	26.2	26.9	20.3
Age: 20-21	26.9	27.0	24.9
Age: 22-23	25.5	25.3	27.4
Age: 24-25	21.4	20.9	27.5
White Non-Hispanic	56.3	62.0	76.2
Black Non-Hispanic	11.4	11.9	9.1
Hispanic	24.1	19.2	8.3
Other	8.2	6.9	6.4
High School or Less	52.0	53.8	69.8
Some College	48.0	46.2	30.2
Live in Metro Areas	86.0	84.9	78.4
High Sensation Seeker	64.7	64.7	62.6
Had A Sibling Who Smoked	40.0	38.3	49.6
Lived With A Smoker	51.3	52.5	71.7
At Least One of Four Closest Friends Uses Tobacco	87.7	86.4	90.0

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

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. In the sample for the behavior analysis, the weighted sample of Not Daily Tobacco Users

(weighted $n = 650$) differed substantially from the Daily Tobacco Users (weighted $n = 538$), especially in the distribution of age, race/ethnicity, education, metropolitan living status, whether participants lived with a smoker, and whether participants had at least one of four close friends who used tobacco (all differences significant at $p < .05$; Table 4).

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 15.5%, ranging from -0.8% to 32.0%. The median percentage to gain in the behavior analysis was 7.8%, ranging from -4.9% to 23.6% (Table 5). On the whole, these findings indicate that most of the message themes were at least somewhat promising; although obviously, caution would need to be applied when using either of the themes that produced a negative percentage to gain in one of the analyses (General Social Norms (NS), -0.8% in the intention analysis; General Social Norms (S), -4.9% in the behavior analysis). 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 relevant to the FDA's regulatory authority. While it is important to note that the data did not indicate that any of the themes would have a detrimental effect if they were used as the basis for a campaign (i.e., there were no negative percentages to gain or ORs; Table 5), the Relative Promise Index did indicate that the Physical (Health) Effects theme was the most promising of the six (Figure 1).

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	61	23.6%	4.14	72%	10.8%	1.86	72%
Physical (Cosmetic) Effects	49	15.5%	2.80	67%	8.3%	1.67	66%
Harmful Ingredients: Common Products[a]	46	15.5%	3.49	54%	6.5%	1.59	58%
Youth Susceptibility to Health Effects	44	14.1%	2.70	63%	5.9%	1.45	64%
Addiction	42	13.7%	2.64	63%	4.4%	1.33	61%
Harmful Ingredients: Health Effects[a]	37	12.7%	3.11	56%	1.4%	1.11	53%
FDA Less Relevant							
Injunctive Social Norms from Peers	83	28.7%	3.74	91%	23.6%	3.29	91%
Mood Effects	76	32.0%	4.77	87%	15.0%	2.09	87%
Injunctive Social Norms from Parents	60	13.5%	2.18	76%	18.8%	2.87	77%
Social Perceptions (S)	57	15.5%	2.14	86%	15.0%	2.10	86%
Self-Efficacy	57	20.2%	4.46	62%	10.7%	2.02	62%
Expression of Independence (S)	55	19.8%	2.80	82%	9.2%	1.59	82%
Endangering Others	54	21.0%	3.78	69%	7.4%	1.54	70%
Social Perceptions (NS)	46	12.7%	2.06	76%	8.4%	1.58	76%
Impact on Sports	45	16.0%	3.16	62%	4.8%	1.37	62%

General Social Norms (S)	43	25.2%	3.58	85%	-4.9%	0.79	84%
Cost of Smoking	42	16.3%	3.91	56%	2.1%	1.17	54%
Peer Pressure from Others	40	6.3%	1.43	77%	9.7%	1.68	77%
Expression of Independence (NS)	38	12.3%	2.19	69%	3.0%	1.19	69%
General Social Norms (NS)	26	-0.8%	0.96	86%	4.7%	1.25	85%

Note. $N = 497$ for the intention analysis and $N = 1,188$ 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).
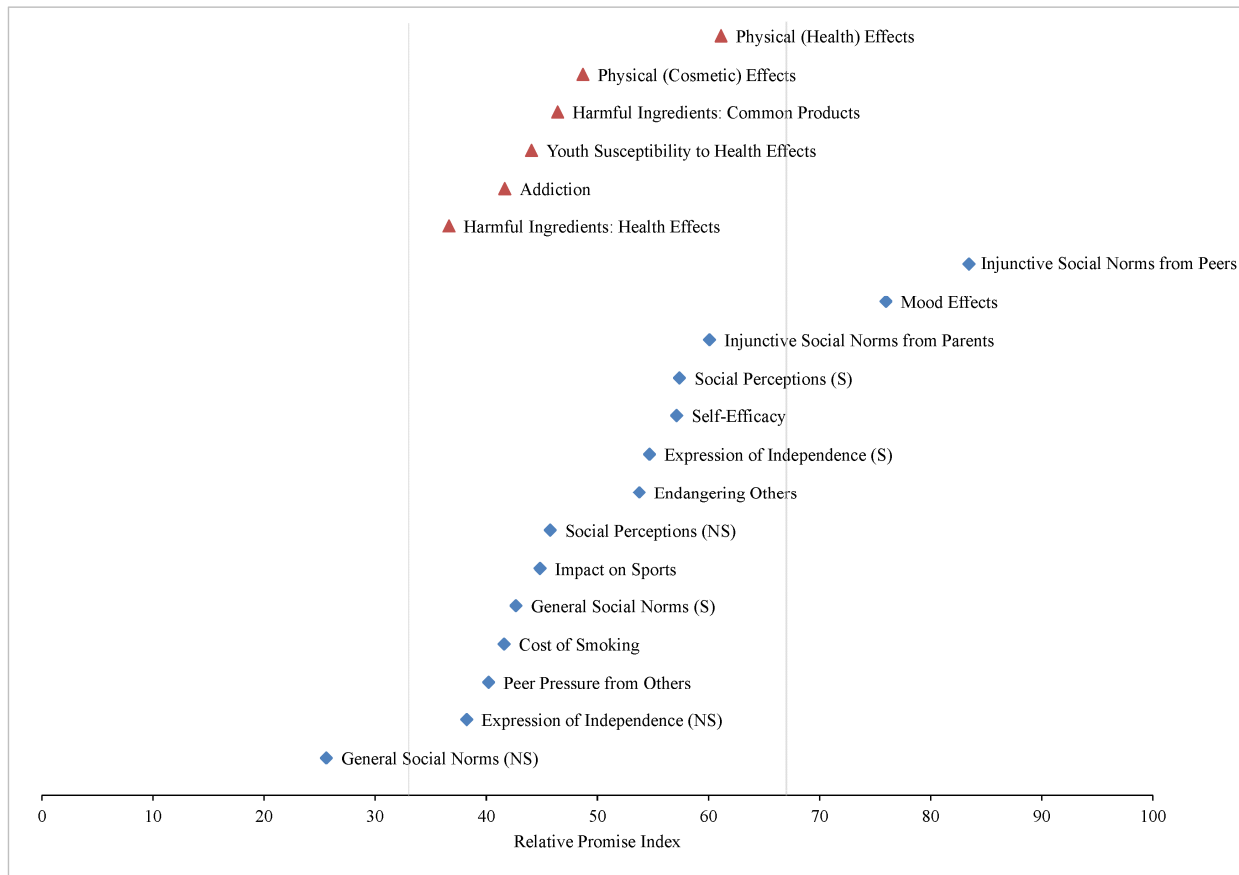
Figure 1. Relative Promise Index values for the 20 message themes. Red triangles next to the theme labels indicate that this theme is one of the six campaign themes most relevant to the FDA's regulatory authority; blue diamonds next to the theme labels indicate that this theme is one of the 14 campaign themes that are less relevant to the FDA's regulatory authority. (S) next to theme labels indicates the items had a "smoking" framing; (NS) next to labels indicates the items had a "not smoking" framing. Vertical lines mark one standard deviation below (33) and above (67) the mean.

Although the value on the Relative Promise Index for this theme was not greater than one standard deviation above the mean, this scale had high (intention analysis) and moderate (behavior analysis) percentage to gain values, moderate odds ratios and high percentage to move values (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 progression to daily tobacco use among 18 – 25 year olds.

Four of the FDA relevant themes were similarly ranked on the Relative Promise Index: Physical (Cosmetic) Effects; Harmful Ingredients: Common Products framing; Youth Susceptibility to Health Effects; and Addiction. These themes all had values on the Relative Promise Index that were within one standard deviation of the mean, along with moderate percentages to gain, odds ratios and percentages to move, and there is little to differentiate them. The sixth theme, Harmful Ingredients: Health Effects framing, was somewhat less promising than the others, driven by a particularly low percentage to gain and odds ratio in the behavior analysis. Although a campaign targeting beliefs about the negative health effects caused by inhaling the harmful ingredients in cigarettes would still be likely to have some positive effect, these results indicate that this set of beliefs is not a particularly strong predictor of daily versus non-daily tobacco use.

3.2.2. Other Potential Campaign Themes

Of the remaining 14 campaign themes, the data suggested that two of the themes may be particularly promising—Injunctive Social Norms from Peers and Mood Effects; however, these findings should be interpreted with caution. Although both of these themes had values on the Relative Promise Index that were greater than one standard deviation above the mean (Figure 1), along with high percentage to gain values and odds ratios, they also had particularly high percentage to move values (91% and 87%, respectively, in both analyses), indicating that very few respondents (i.e., 8% and 13%, respectively) endorsed these beliefs (Table 5). In the case of these two themes in particular, it is likely that this low level of endorsement reflects respondents' own experiences with tobacco use, such that it is unlikely that a mass media campaign could easily change these beliefs. For instance, the Injunctive Social Norms from Peers theme is comprised of beliefs about the likelihood that friends or "others my age" would disapprove of or not accept the respondents' smoking. If the respondent has not already experienced such disapproval, then it is unlikely that a campaign message could convince them that it is likely to occur. A similar problem exists for the Mood Effects beliefs. Therefore, despite the strong associations between these themes and intentions/behavior, it is unlikely that a campaign targeting either of those themes would be particularly effective at preventing progression to daily tobacco use.

Of the 11 scales that were moderately ranked on the Relative Promise Index (within one standard deviation of the mean), five showed a slightly higher level of promise: Injunctive Social Norms from Parents; Social Perceptions (Smoking); Self-Efficacy; Expression of Independence (Smoking); and Endangering Others. These five themes all had high or moderate percentage to gain values, odds ratios and percentage to move values, and they were all similarly ranked on the Relative Promise Index. The remaining six themes showed slightly less promise: Social Perceptions (Not Smoking); Impact on Sports; General Social Norms (Smoking); Cost of Smoking; Peer Pressure from Others; and Expression of Independence (Not Smoking). These themes all had moderate or low percentage to gain values, odds ratios and percentage to moves, and as such, would all be expected to have approximately the same moderate effect as the target of a campaign to stop progression to daily tobacco use (Table 5).

Overall, the General Social Norms (Not Smoking) theme was the least promising of all 20 message themes. This scale had a value on the Relative Promise Index that was lower than one standard deviation below the mean, along with a negative percentage to gain value in the intention analysis (-0.8%), and odds ratios at or close to 1.0 (OR = 1.0 in intention analysis and OR = 1.3 in behavior analysis), indicating a very weak association between beliefs about how normative it is not to smoke and the likelihood that young adult smokers have *no* intention to smoke daily and are Not Daily rather than Daily Tobacco Users. There was little evidence that a campaign based on this theme would have any positive effects. We should also note that the General Social Norms (Smoking) theme also had a negative percentage to gain in the behavior analysis (-4.9%). Although this theme performed much more strongly in the intention analysis (percentage to gain = 25.2%), it is unlikely that a campaign based on this theme would reduce rates of progression to daily tobacco use.

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]) only 8 (7%) were statistically significant and these moderation effects were distributed across eight themes (Appendix B). Similarly, only 3 (3%) of the 120 between-group comparisons provided evidence of significant moderation in the behavior analyses, and these effects were distributed across two themes (Appendix C). As such, these results indicate that the campaign themes that are most (least) promising overall are likely to be promising (less promising) at reducing the likelihood that all members of the target audience progress to daily tobacco use.

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 not smoking. In almost every case, we found that the theme that referred to the consequences of smoking was more promising than the comparable theme that referred to the consequences of not smoking, and for most of the individual beliefs within these themes, this was also the case (see Figure 1, Table 5, and Appendices A and B). For example, for Expression of Independence, the percentage to gain for the smoking framing was greater than the percentage to gain for the not smoking framing in the intention analysis (19.8% vs. 12.3%) and in the behavior analysis (9.2% vs. 3.0%). In addition, in both the intention and behavior analyses, two out of three individual Expression of Independence (Smoking) beliefs with the smoking framing had higher percentages to gain than the comparable belief items in the not smoking framing. Similar patterns were observed for the majority of beliefs in the Social Perceptions theme in both analyses, and for the General Social Norms theme in the intention analysis.

4. Conclusions

Of the six potential campaign themes that we identified as being relevant to the FDA's regulatory authority, the most promising was the Physical (Health) Effects theme, the least promising was the Harmful Ingredients: Health Effects framing theme, and the other four themes were all similarly moderately ranked. Of the remaining 14 themes, the two that appeared most promising overall (Injunctive Social Norms from Peers and Mood Effects) should only be used with caution given that their particularly high percentage to move values suggest that messages targeting these beliefs might be contradicted by real world experiences and therefore the beliefs would be particularly difficult to change. Overall, the General Social Norms (Not Smoking) theme was the least promising and there was very little evidence that a campaign based on this theme would have a positive effect. However, it is critical that all of these findings are interpreted by considering 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

Fishbein, M. & Ajzen, I. (2010). *Predicting and changing behavior. The reasoned action approach*. New York, NY: Taylor & Francis.

Hornik, R., & Woolf, K. D. (1999). Using cross-sectional surveys to plan message strategies. *Social Marketing Quarterly*, 5(2), 34-41.

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 21.7 – 52.1%; percentage to gain values in the fifth (bottom) quintile ranged from -5.1 – 12.0%. In the behavior analysis, percentage to gain values in the first quintile ranged from 9.9 – 22.6%; percentage to gain values in the fifth quintile ranged from -10.6 – 1.4%. In the table, those in the first quintile 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						
Physical (Health) Effects						
Clog my arteries	**29.8**	**5.21**	**77**	3.8	1.22	76
Be able to focus (very unlikely)	**25.7**	**3.93**	**81**	**19.2**	**2.68**	**84**
Develop circulation problems	**25.5**	**4.43**	**78**	*0.8*	*1.05*	*73*
Keep myself from overeating (very unlikely)	**24.4**	**3.77**	**79**	7.9	1.50	80
Develop inflammation in my lungs	**23.7**	**4.27**	**72**	4.9	1.32	71
Have a burning feeling in my throat	**21.7**	**3.25**	**79**	*-0.7*	*0.96*	*73*
Have difficulty concentrating	21.7	3.25	80	8.8	1.59	80
Lose my taste buds	21.6	3.50	75	8.2	1.58	75
Develop bad coughs and phlegm	20.9	4.42	62	3.3	1.25	61
Get sick more easily	20.2	3.66	71	**11.7**	**1.94**	**74**
Have a soothing feeling in my throat (very unlikely)	19.4	3.22	74	5.3	1.34	73
Develop high blood pressure	18.5	2.62	82	*0.4*	*1.02*	*76*
Develop mouth cancer	17.7	2.81	74	5.9	1.38	74
Develop diseases in my toes and fingers	17.6	2.36	85	2.0	1.11	83
Become short of breath	16.6	3.28	62	1.6	1.11	62
Develop headaches	15.9	2.54	74	**10.3**	**1.76**	**77**
Develop a blood clot in my brain	15.1	2.19	84	4.7	1.27	81
Develop fatal lung disease	14.8	2.59	69	3.5	1.23	71
Damage my body	14.5	3.27	54	6.6	1.57	59
Develop throat cancer	14.2	2.24	77	*0.8*	*1.05*	*74*
Suffer a stroke	14.2	2.07	84	*-0.3*	*0.99*	*80*

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Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Need chemotherapy and radiation	14.0	2.13	82	5.3	1.32	80
Develop lung cancer	13.8	2.36	67	7.9	1.58	71
Die an early death	13.2	2.29	70	4.8	1.33	69
Develop sexual and/or fertility problems	12.4	1.95	81	9.4	1.61	82
Develop cancer	12.3	2.28	72	6.1	1.43	69
Harm my health	12.0	2.89	55	2.5	1.21	54
Destroy my brain cells	*11.8*	*2.07*	*71*	**10.0**	**1.76**	**73**
Stunt my growth	*11.6*	*1.92*	*80*	8.9	1.58	81
Develop heart disease	*11.3*	*1.94*	*77*	4.6	1.29	74
Be able to deal with physical pain (very unlikely)	*11.1*	*1.85*	*77*	7.0	1.46	75
Physical (Cosmetic) Effects						
Have a bad taste in my mouth	**23.9**	**4.89**	**64**	7.4	1.57	66
Get yellow teeth	19.6	4.08	61	5.5	1.43	62
Have smelly hair and clothes	19.4	5.00	61	5.0	1.39	62
Look gross	19.2	2.82	77	**12.5**	**1.97**	**78**
Get wrinkles	18.3	2.81	76	7.2	1.50	73
Have a smelly home	14.6	2.62	67	7.2	1.55	67
Get bad breath	13.8	2.97	59	2.1	1.16	57
Develop brittle hair	12.9	2.03	76	7.0	1.45	77
Develop uneven skin coloring	12.4	1.96	79	3.0	1.18	75
Get yellow fingers	*7.5*	*1.57*	*76*	4.8	1.29	76
Harmful Ingredients: Common Products Framing						
Inhale lead, which is also found in some paints	21.1	3.67	69	6.0	1.44	69

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 nickel, which is also found in stainless steel	19.4	3.25	69	7.1	1.50	73
Inhale ammonia, which is also found in many household cleaners	19.4	3.36	68	4.0	1.26	69
Inhale poisons	19.0	3.88	61	6.8	1.57	62
Inhale acetone, which is also found in nail polish remover	19.0	3.23	68	6.9	1.51	70
Inhale arsenic, which is also found in car batteries	17.1	3.01	66	6.1	1.45	68
Inhale carbon monoxide, which is also found in car exhaust	16.8	3.16	62	3.3	1.25	62
Inhale benzene, which is also found in some types of detergents	16.6	2.89	66	**9.9**	**1.81**	**70**
Inhale tar, which is also used to pave roads and driveways	15.7	3.32	57	3.1	1.23	60
Inhale formaldehyde, which is also found in glues and adhesives	15.5	2.79	64	3.4	1.24	65
Inhale mercury, which is also found in mascara	15.4	2.55	69	7.5	1.56	70
Inhale chemicals	14.8	3.45	53	2.0	1.17	54
Inhale nicotine	*11.2*	*2.92*	*47*	*-0.4*	*0.97*	*47*
Youth Susceptibility to Health Effects						
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]	15.0	2.69	67	4.2	1.29	68
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]	14.6	2.59	68	4.9	1.34	68
Be just as likely to damage my body as an adult smoker would	13.5	2.52	65	5.8	1.43	67
Addiction						
Be unable to stop smoking when I want to	**22.0**	**3.51**	**76**	*-2.7*	*0.86*	*73*
Eventually need to smoke even more	18.8	3.50	66	8.4	1.65	69
Become addicted to cigarettes	14.4	2.75	63	*-2.6*	*0.83*	*54*
Be controlled by smoking	*11.7*	*1.99*	*77*	3.6	1.23	74
Become addicted to nicotine	*9.6*	*1.97*	*61*	*0.7*	*1.05*	*55*

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Harmful Ingredients: Health Effects Framing						
Inhale nickel, which makes it hard to breathe	**21.7**	**3.95**	**73**	*0.0*	*1.00*	*69*
Inhale benzene, which damages the heart	20.2	3.62	73	*-0.8*	*0.95*	*70*
Inhale formaldehyde, which harms the lungs	19.3	4.03	67	1.8	1.13	60
Inhale lead, which causes cancer	18.1	3.33	71	3.2	1.22	66
Inhale acetone, which makes it hard to breathe	17.9	3.23	72	1.6	1.11	65
Inhale mercury, which causes cancer	16.6	3.01	71	2.8	1.18	69
Inhale poisons that damage the body	16.1	3.32	65	2.6	1.19	61
Inhale tar, which causes lung cancer	15.1	3.41	61	*0.4*	*1.03*	*57*
Inhale ammonia, which harms the lungs	14.0	2.76	67	3.5	1.25	63
Inhale nicotine, which causes addiction	13.6	2.84	64	*1.3*	*1.10*	*57*
Inhale carbon monoxide, which causes sexual and/or fertility problems	13.2	2.51	69	2.6	1.18	65
Inhale chemicals that damage the body	12.7	3.14	56	*1.2*	*1.10*	*54*
Inhale arsenic, which damages the heart	12.1	2.41	66	3.0	1.21	64
FDA Less Relevant						
Injunctive Social Norms from Peers						
Others my age will accept it (very unlikely)	**32.9**	**5.21**	**86**	**22.6**	**3.27**	**86**
My friends won't care about it (very unlikely)	**24.4**	**3.33**	**85**	**20.3**	**2.90**	**86**
My friends will accept it (very unlikely)	**22.7**	**2.96**	**87**	**19.3**	**2.58**	**88**
My friends will disapprove	20.4	2.76	85	7.8	1.46	84
Others my age won't care about it (very unlikely)	15.1	2.11	89	8.8	1.50	91
Others my age will disapprove	*10.7*	*1.68*	*88*	7.7	1.45	86
Mood Effects						

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Feel relaxed (very unlikely)	**37.0**	**5.98**	**89**	5.6	1.29	90
Feel more comfortable in social situations (very unlikely)	**30.0**	**4.83**	**82**	9.4	1.61	82
Be able to control my anger (very unlikely)	**28.8**	**4.13**	**86**	**10.2**	**1.66**	**84**
Enjoy life more (very unlikely)	**28.5**	**5.02**	**76**	**14.4**	**2.19**	**78**
Feel less bored (very unlikely)	**28.0**	**3.94**	**86**	3.3	1.17	83
Feel better when I am sad (very unlikely)	**27.3**	**3.84**	**85**	**16.3**	**2.29**	**84**
Feel content (very unlikely)	**27.0**	**3.93**	**83**	**16.1**	**2.25**	**84**
Feel less cranky (very unlikely)	**26.1**	**3.77**	**84**	**21.1**	**3.00**	**86**
Have something to do with my hands (very unlikely)	**24.9**	**3.23**	**88**	3.1	1.15	89
Be able to forget about my problems (very unlikely)	20.5	3.04	77	5.1	1.32	75
Injunctive Social Norms from Parents						
My parent(s)/guardian(s) will be upset	**21.7**	**3.57**	**74**	**12.9**	**2.12**	**72**
My parent(s)/guardian(s) will disapprove	13.4	2.46	69	**14.1**	**2.40**	**68**
Get in trouble with my parent(s)/guardian(s)	*9.5*	*1.60*	*89*	**22.4**	**3.12**	**89**
Social Perceptions (Smoking)						
Look attractive (very unlikely)	**30.7**	**6.23**	**73**	6.5	1.42	75
Get respect from others my age (very unlikely)	**29.1**	**5.00**	**77**	4.3	1.26	77
Be unable to go to places that don't allow smoking	**24.7**	**3.71**	**81**	8.5	1.55	79
Look confident (very unlikely)	**24.4**	**3.81**	**79**	7.7	1.50	78
Gain friends (very unlikely)	**22.8**	**3.47**	**78**	3.9	1.22	77
Look intelligent (very unlikely)	**22.5**	**4.12**	**71**	**10.4**	**1.87**	**70**
Be sexually/romantically appealing (very unlikely)	20.6	3.32	75	**12.2**	**1.98**	**76**
Be able to show others that I'm not afraid to take risks (very unlikely)	18.7	2.91	76	*-0.6*	*0.97*	*78*

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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 mature (very unlikely)	17.6	2.62	81	*0.4*	*1.02*	*78*
Look cool (very unlikely)	17.0	2.74	71	2.9	1.18	68
Be popular (very unlikely)	16.2	2.77	69	*-1.6*	*0.91*	*68*
Lose friends	15.0	2.07	90	4.7	1.25	88
Be sexually/romantically undesirable	14.7	2.30	81	**17.3**	**2.47**	**82**
Gain respect from my brother(s) and/or sister(s) (very unlikely)	14.0	2.80	62	5.9	1.46	64
Look stupid	13.7	2.11	77	**10.7**	**1.75**	**80**
Lose respect from others my age	12.8	1.84	88	**11.6**	**1.76**	**87**
Look immature	*9.5*	*1.59*	*86*	*1.4*	*1.07*	*84*
Look ridiculous	*9.5*	*1.59*	*87*	3.2	1.17	83
Lose respect from my brother(s) and/or sister(s)	*7.6*	*1.52*	*81*	**14.5**	**2.06**	**84**
Not look confident	*7.1*	*1.40*	*87*	9.2	1.58	84
Be unpopular	*2.9*	*1.15*	*90*	*1.4*	*1.07*	*88*
Look unattractive	*-2.1*	*0.88*	*77*	8.6	1.57	78
Look uncool	*-4.3*	*0.79*	*84*	**11.7**	**1.81**	**83**
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]	20.1	4.08	64	8.1	1.69	64
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]	18.6	3.41	67	**9.9**	**1.84**	**67**
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]	17.7	3.99	59	9.9	1.96	61
Expression of Independence (Smoking)						
Have control over my life (very unlikely)	**34.0**	**6.84**	**81**	**12.0**	**1.90**	**81**

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 making my own decisions (very unlikely)	13.5	1.90	90	**17.8**	**2.41**	**89**
Show that I am independent (very unlikely)	12.1	1.95	76	3.4	1.20	74
Endangering Others						
Harm my future children	**28.6**	**5.86**	**73**	**10.1**	**1.73**	**76**
Harm nonsmokers through second-hand smoke	21.6	4.32	66	9.4	1.77	68
Harm my friends and family through second-hand smoke	20.6	3.61	71	7.0	1.50	70
Harm children through second-hand smoke	20.0	3.20	74	9.9	1.74	73
Social Perceptions (Not Smoking)						
Look confident[c]	**23.5**	**3.89**	**75**	4.8	1.30	76
Get respect from others my age[c]	20.0	3.06	78	*1.2*	*1.07*	*76*
Be sexually/romantically appealing[c]	16.0	2.47	77	9.5	1.70	75
Look mature[c]	15.3	2.23	79	1.5	1.08	76
Look cool[c]	14.6	2.13	84	5.8	1.32	83
Gain respect from my brother(s) and/or sister(s)[c]	13.5	2.46	69	4.9	1.33	71
Look intelligent[c]	*10.8*	*1.82*	79	8.3	1.55	78
Look attractive[c]	*9.0*	*1.68*	*74*	3.2	1.19	73
Be popular[c]	*6.0*	*1.34*	*88*	*-4.3*	*0.82*	*87*
Gain friends[c]	*3.1*	*1.20*	*79*	**15.0**	**2.15**	**83**
Impact on Sports						
Lose my breath easily while playing sports	18.8	3.75	63	*-0.2*	*0.99*	*60*
Have less energy to play sports	16.0	3.17	62	6.5	1.53	63
Do poorly in sports	*9.3*	*1.69*	*76*	4.1	1.26	73
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 doing what most others my age are doing (very unlikely)	**52.1**	**16.45**	**88**	*-2.4*	*0.90*	*87*
Be more like everyone else (very unlikely)	15.0	2.28	80	*-6.3*	*0.73*	*82*
Cost of Smoking						
Spend more money on doctor and dentist visits	**23.0**	**3.85**	**75**	**10.0**	**1.76**	**73**
Spend hundreds of dollars on tobacco products a year	18.7	4.33	59	*-3.3*	*0.78*	*54*
Have less spending money	16.8	4.12	57	*0.9*	*1.07*	*54*
Spend thousands of dollars on tobacco products over my lifetime	15.0	3.50	56	1.5	1.12	54
Waste money I could have spent on other things	*8.5*	*2.43*	*46*	3.1	1.31	47
Peer Pressure from Others						
Do your friends offer you a smoke? (never)[d]	*7.6*	*1.47*	*85*	7.5	1.44	84
Do others your age encourage you to smoke? (never)[d]	*2.4*	*1.19*	*63*	*-4.6*	*0.74*	*60*
Expression of Independence (Not Smoking)						
Be showing that I am independent[c]	15.3	2.42	73	3.7	1.22	74
Be making my own decisions[c]	*12.0*	*2.36*	*62*	4.6	1.33	66
Have control over my life every day[c]	*10.3*	*1.95*	*70*	2.2	1.15	68
General Social Norms (Not Smoking)						
Be doing what most others my age are doing[c]	0.1	1.01	84	*-1.3*	*0.94*	*83*
Be more like everyone else[c]	-5.1	0.76	89	3.3	1.17	88
Individual Belief Items (not included in any scale)						
Have a pleasant taste in my mouth (very unlikely)	20.5	4.25	65	7.5	1.59	66
My parent(s)/guardian(s) won't care about it	20.4	3.43	71	8.6	1.66	71
Lose weight (very unlikely)	20.0	2.76	82	*-1.4*	*0.93*	*82*
Lose my appetite (very unlikely)	19.9	2.71	83	*-10.6*	*0.60*	*83*

Belief Items (within themes)	Intention Analysis			Behavior Analysis		
	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
Influence my brother or sister to smoke	18.2	2.33	92	**13.8**	**1.92**	**93**
Have you tried to convince your friends not to smoke (almost always)[e]	16.6	2.18	90	3.9	1.19	91
Get a buzz (very unlikely)	16.1	2.28	81	*-9.6*	*0.61*	*79*
Constantly think about smoking	*12.0*	*1.95*	*82*	*-0.9*	*0.96*	*79*
How often do your brother(s) and/or sister(s) smoke around you (never)	*5.0*	*1.30*	*94*	**20.5**	**2.51**	**93**
Develop a scratchy voice	*3.2*	*1.19*	*80*	**10.5**	**1.71**	**81**

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=497	Male n=293	Female n=204	18-21 year olds n=264	22-25 year olds n=233	White (ref) n=280	Black n=57	Hispanic n=120	High school or less n=258	Some college n=239	Low Sensation Seekers n=176	High Sensation Seekers n=321
FDA Relevant												
Physical (Health) Effects	23.6%	28.7%	18.2%	24.2%	22.9%	24.9%	12.4%	20.2%	22.8%	21.5%	21.0%	25.1%
Physical (Cosmetic) Effects	15.5%	17.6%	13.0%	17.2%	13.7%	**19.2%**	**-2.8%**	10.7%	11.1%	17.0%	14.5%	15.9%
Harmful Ingredients: Common Products[a]	15.5%	22.2%	8.9%	19.6%	12.1%	15.1%	17.0%	15.1%	21.6%	10.2%	13.6%	16.2%
Youth Susceptibility to Health Effects	14.1%	13.3%	15.0%	14.3%	13.9%	13.1%	-0.3%	22.1%	9.0%	17.7%	**5.4%**	**18.4%**
Addiction	13.7%	11.8%	16.4%	19.3%	7.9%	**17.6%**	**-6.5%**	10.1%	12.8%	12.8%	11.8%	14.6%
Harmful Ingredients: Health Effects[a]	12.7%	15.4%	9.2%	14.6%	10.1%	11.5%	-9.0%	20.9%	8.4%	12.7%	11.1%	13.3%
FDA Less Relevant												
Injunctive Social Norms from Peers	28.7%	35.9%	20.8%	22.1%	34.0%	34.7%	40.4%	-0.9%	23.2%	30.0%	34.4%	25.2%
Mood Effects	32.0%	36.9%	25.9%	34.2%	29.8%	35.2%	33.2%	27.1%	36.2%	26.8%	41.3%	27.2%
Injunctive Social Norms from Parents	13.5%	12.3%	15.1%	13.9%	13.3%	13.5%	7.4%	7.2%	12.6%	11.4%	**-0.7%**	**17.6%**
Social Perceptions (S)	15.5%	19.8%	8.7%	8.8%	21.7%	22.0%	14.8%	11.1%	14.5%	15.9%	16.0%	15.4%
Self-Efficacy	20.2%	21.6%	18.3%	17.9%	23.0%	15.5%	25.2%	28.5%	**26.4%**	**13.5%**	18.1%	21.1%
Expression of Independence (S)	19.8%	**34.5%**	**7.1%**	19.2%	20.4%	20.3%	34.7%	9.8%	20.3%	17.2%	23.4%	17.1%
Endangering Others	21.0%	24.7%	16.8%	22.8%	19.0%	24.2%	11.5%	17.8%	19.8%	20.5%	16.5%	22.8%
Social Perceptions (NS)	12.7%	18.5%	3.9%	12.8%	12.7%	18.8%	13.4%	-1.1%	12.4%	13.2%	8.1%	14.6%
Impact on Sports	16.0%	17.6%	13.7%	17.5%	14.1%	16.2%	6.3%	18.8%	11.5%	19.7%	22.4%	13.3%
General Social Norms (S)	25.2%	**37.9%**	**8.7%**	17.3%	33.4%	21.1%	31.1%	18.5%	27.3%	23.4%	32.9%	20.3%
Cost of Smoking	16.3%	21.3%	11.1%	20.2%	12.4%	**15.3%**	**-2.0%**	22.8%	14.8%	15.5%	16.0%	16.3%
Peer Pressure from Others	6.3%	5.2%	7.6%	8.6%	4.3%	7.8%	-10.3%	-3.3%	7.0%	6.4%	0.7%	11.9%
Expression of Independence (NS)	12.3%	10.5%	14.7%	8.0%	17.3%	17.2%	19.3%	0.0%	11.8%	13.8%	3.4%	16.3%
General Social Norms (NS)	-0.8%	1.3%	-4.9%	1.5%	-2.7%	5.9%	-8.2%	-6.6%	2.4%	-4.0%	-8.2%	3.2%

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 ($n = 41$) 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. Caution must be used when interpreting the results for Whites vs. Blacks in this set of analyses, given the particularly small sample of Blacks. 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=1188	Male n=745	Female n=443	18-21 year olds n=593	22-25 year olds n=595	White (ref) n=813	Black n=126	Hispanic n=170	High school or less n=725	Some college n=463	Low Sensation Seekers n=431	High Sensation Seekers n=757
FDA Relevant												
Physical (Health) Effects	10.8%	8.2%	15.3%	11.3%	10.5%	11.8%	15.0%	9.9%	6.1%	12.7%	8.9%	11.6%
Physical (Cosmetic) Effects	8.3%	8.0%	8.8%	8.9%	8.0%	8.5%	7.2%	10.9%	5.2%	10.1%	7.0%	8.7%
Harmful Ingredients: Common Products[a]	6.5%	4.7%	9.9%	8.1%	5.5%	7.4%	-0.8%	13.2%	8.3%	1.2%	7.4%	5.5%
Youth Susceptibility to Health Effects	5.9%	7.9%	4.1%	9.8%	2.4%	6.3%	6.3%	14.3%	4.8%	5.6%	9.9%	4.0%
Addiction	4.4%	5.8%	2.0%	5.9%	3.5%	5.2%	1.1%	10.4%	1.6%	6.5%	2.3%	5.2%
Harmful Ingredients: Health Effects[a]	1.4%	3.8%	-1.5%	0.8%	2.5%	4.1%	-2.1%	0.4%	-2.3%	4.1%	1.2%	1.8%
FDA Less Relevant												
Injunctive Social Norms from Peers	23.6%	24.8%	20.7%	**32.5%**	**16.0%**	**25.3%**	29.2%	**3.9%**	25.5%	19.1%	27.1%	21.9%
Mood Effects	15.0%	12.7%	18.7%	13.3%	16.4%	14.2%	22.5%	10.9%	9.5%	20.9%	8.7%	19.4%
Injunctive Social Norms from Parents	18.8%	16.2%	23.3%	22.5%	14.1%	21.9%	7.4%	10.1%	19.0%	14.5%	22.1%	17.0%
Social Perceptions (S)	15.0%	15.0%	14.7%	10.0%	20.1%	15.3%	22.8%	13.9%	12.8%	18.5%	15.2%	15.0%
Self-Efficacy	10.7%	8.3%	14.6%	7.6%	13.3%	11.9%	4.9%	8.3%	10.6%	8.8%	11.6%	10.1%
Expression of Independence (S)	9.2%	9.0%	9.8%	9.3%	9.4%	7.9%	14.9%	9.7%	**3.0%**	**16.9%**	6.3%	11.3%
Endangering Others	7.4%	5.1%	11.3%	9.8%	5.3%	9.4%	1.9%	11.3%	3.9%	10.4%	6.0%	7.9%
Social Perceptions (NS)	8.4%	6.4%	11.9%	11.6%	6.3%	7.3%	11.8%	3.3%	8.9%	7.9%	4.2%	10.1%
Impact on Sports	4.8%	4.3%	5.9%	5.8%	3.7%	6.1%	6.9%	13.1%	2.9%	7.0%	2.1%	5.7%
General Social Norms (S)	-4.9%	-3.4%	-6.4%	-5.1%	-3.8%	-4.5%	13.8%	-9.2%	-8.3%	2.7%	-2.7%	-6.3%
Cost of Smoking	2.1%	3.5%	0.9%	2.6%	2.1%	3.4%	3.0%	4.0%	-0.3%	2.8%	2.5%	1.7%
Peer Pressure from Others	9.7%	12.7%	6.9%	12.6%	7.1%	11.5%	5.2%	3.8%	8.9%	12.2%	8.0%	11.6%
Expression of Independence (NS)	3.0%	0.4%	7.2%	4.3%	2.1%	1.6%	9.5%	-0.1%	3.1%	3.1%	0.4%	3.6%
General Social Norms (NS)	4.7%	3.0%	7.2%	5.3%	4.4%	5.5%	-12.1%	8.5%	8.8%	-1.4%	7.4%	3.1%

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* = 79) 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.