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# Identifying Potential Target Beliefs for a Mass Media Campaign Aimed at Encouraging Smoking Cessation: Final Findings and Recommendations for 18 – 25 Year Old Current Cigarette Smokers

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# Identifying Potential Target Beliefs for a Mass Media Campaign Aimed at Encouraging Smoking Cessation: Final Findings and Recommendations for 18 – 25 Year Old Current Cigarette Smokers

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CECCR Working Paper Series

**Identifying potential target beliefs for a mass media campaign aimed at  
encouraging smoking cessation: Final findings and recommendations for  
18 – 25 year old current cigarette smokers**

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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 encouraging smoking cessation among 18 – 25 year olds who are current established cigarette smokers. 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 promoting smoking cessation among 18 – 25 year olds.<sup>1</sup> According to theories of behavioral prediction (e.g., the Theory of Reasoned Action; Fishbein & Ajzen, 2010), increases in smoking cessation are likely to be achieved by reducing the number of current established smokers who have some openness (i.e., intentions) to continue smoking; and reductions in the number of current smokers who intend to continue smoking are likely to be achieved by increasing endorsement of the smoking-related beliefs that are most strongly associated with having *no* intention to continue smoking. As such, the target audience of these campaign messages is assumed to be current cigarette smokers, with the expectation that the messages will increase the likelihood that these smokers will quit smoking, becoming former cigarette smokers. Therefore, in order to identify the most promising message themes (sets of beliefs), and within each theme, specific messages (beliefs), to be targeted in a cessation campaign, we conducted analyses comparing the rate of endorsement of beliefs among former cigarette smokers with that of current cigarette smokers (*behavior analysis*).

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<sup>1</sup> 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 23<sup>rd</sup>, 2013); themes for a campaign aimed at preventing initiation among 18 – 25 year olds (shared with the FDA on November 1<sup>st</sup>, 2013); and themes for a campaign aimed at stopping smoking progression to daily smoking among 18 – 25 year olds (shared with the FDA on November 1<sup>st</sup>, 2013).

## **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)<sup>2</sup>), 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 sample (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 compared the smoking-related beliefs held by Former Established Cigarette Smokers—defined as those who had previously smoked more than 100 cigarettes in their lifetime but had not smoked a cigarette for more than six months, and had not used any other tobacco products in the past 30 days (referred to as “Former Smokers”), with the beliefs held by Current Established Cigarette Smokers—defined as those who had smoked more than 100 cigarettes in their lifetime and had smoked a cigarette in the past 30 days (referred to as “Current Smokers”). The unweighted sample size was 980 (Former Smokers = 111 (11%); Current Smokers = 869 (89%)), and because some respondents had missing data on the variables

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<sup>2</sup> 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.

used for weighting, the weighted sample size was 939 (Former Smokers = 101 (11%); Current Smokers = 838 (89%)).

### **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**

We compared two groups based on their smoking status: Former Smokers and Current Smokers. We identified Former Smokers using five questions: 1) “Have you ever tried cigarette smoking, even one or two puffs?” (*Yes; No*); 2) “Have you smoked at least 100 cigarettes (5 or more packs) in your entire life?” (*Yes; No*); 3) “When was the last time you smoked a cigarette, even one or two puffs?” (*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*); 4) “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 5) “During the past 30 days, did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, dip)?” (*Yes; No*). Respondents who had tried cigarette smoking, had smoked at least 100 cigarettes, had not smoked cigarettes during the past six months, and had not used any other smoked or smokeless tobacco products during the past 30 days were categorized as Former Established Cigarette Smokers (“Former Smokers”). However, because we required that respondents had not recently used any other tobacco products in the past 30 days (in an effort to exclude those smokers who had stopped smoking cigarettes but had transitioned to using other tobacco products), we acknowledge that this group could more accurately be referred to as Former Established Cigarette Smokers and Non-Current Tobacco Users. For simplicity though, we use the Former Smoker label throughout.

Current Smokers were identified using three questions: 1) “Have you ever tried cigarette smoking, even one or two puffs?” (*Yes; No*); 2) “Have you smoked at least 100 cigarettes (5 or more packs) in your entire life?” (*Yes; No*); and 3) “When was the last time you smoked a cigarette, even one or two puffs?” measured as reported above. Respondents who had tried cigarette smoking, had smoked at least 100 cigarettes in their entire life, and had smoked cigarettes in the past month were categorized as Current Established Cigarette Smokers (“Current Smokers”).

#### **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 28<sup>th</sup>, 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 led 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 section 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 authority, throughout this report we present results separately for the six *FDA Relevant* and the 14 *FDA Less Relevant* campaign themes.



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

	<b>Number of Participants with Valid Data</b>	<b>Number of Individual Belief Items in Scale</b>	<b>Scale <math>\alpha</math></b>
<b>FDA Relevant</b>			
Addiction	920	5	0.83
Harmful Ingredients: Common Products	453 <sup>a</sup>	13	0.96
Harmful Ingredients: Health Effects	486 <sup>a</sup>	13	0.96
Physical (Cosmetic) Effects	939	10	0.92
Physical (Health) Effects	939	31	0.96
Youth Susceptibility to Health Effects	939	3	0.78
<b>FDA Less Relevant</b>			
Cost of Smoking	919	5	0.87
Endangering Others	894	4	0.90
Expression of Independence (Smoking)	846	3	0.81
Expression of Independence (Not Smoking)	859	3	0.89
General Social Norms (Smoking)	760	2	0.67 <sup>b</sup>
General Social Norms (Not Smoking)	752	2	0.68 <sup>b</sup>
Impact on Sports	854	3	0.87
Injunctive Social Norms from Parents	838	3	0.79
Injunctive Social Norms from Peers	926	6	0.77
Mood Effects	939	10	0.92
Peer Pressure from Others	939	2	0.52 <sup>b</sup>
Self-Efficacy	939	3	0.94
Social Perceptions (Smoking)	939	23	0.91
Social Perceptions (Not Smoking)	939	10	0.94

*Note.* Data from the analytic sample, which includes  $n = 101$  Former Established Cigarette Smokers and  $n = 838$  Current Established Cigarette Smokers. 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.

<sup>a</sup>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.

<sup>b</sup>Because these scales only consisted of two items, we used a simple correlation between the items rather than Cronbach’s Alpha.

## **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., smoking status). An OR greater than 1.0 indicated that respondents who held the desired belief/s were *more* likely to be Former Smokers 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 be Former Smokers. 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 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 behavior measures. For example, as shown in Table 2, in the cross-tabulation of smoking status (i.e., Current Smokers and Former Smokers) 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, 12.1% of the respondents that were asked this question were Former Smokers. But of those who gave the desired response of “*very unlikely* I will feel more comfortable in social situations”, 33.0% were Former Smokers. If the proportion of the sample endorsing the belief could be increased to 100%, then it is estimated that an *additional 20.9%* of the population would become Former Smokers. That is, the potential percentage to gain (under the best case scenario) is 20.9% (33.0% - 12.1% = 20.9%). 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 Behaviors*

(n = 525)	<i>If I smoke every day, I will feel more comfortable in social situations</i>		
Behavior Status	All others	<u>Very unlikely</u>	Overall
Current Smokers	92.0%	67.0%	87.9%
<b>Former Smokers</b>	8.0%	<b>33.0%</b>	<b>12.1%</b>
% in column	83.4%	16.6%	100%

Percentage to gain: 33.0% - 12.1% = 20.9%

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 behavior (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 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 ( $r = .96$ ), 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) are 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.

### 3. Results

#### 3.1. Sample Characteristics

Table 3 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. In general, the characteristics of the weighted sample of Former Smokers (weighted  $n = 103$ ) were similar to the Current Smokers (weighted  $n = 838$ ), except in the distribution of age and the proportion of respondents who lived with a smoker (differences significant at  $p < .01$ ; Table 3). Because the sample of Former Smokers was small, only slightly more than 100 respondents, it is important to note that these analyses are subject to substantial sampling error, particularly in comparison to the other reports in this series of working papers.

#### 3.2. Main Findings

Table 4 presents percentage to gain, odds ratios, and percentage to move values for each of the 20 campaign themes. We found that the median percentage to gain was 8.7%, ranging from 1.6% to 23.1% (Table 4). Given that all of the percentages to gain were positive, these findings indicate that on the whole, all of the message themes were somewhat promising. We then created an index—the *Relative Promise Index*—that transformed the percentage to gain values into standardized values. Then, to make the resulting values 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;  $\geq 67$ ) or less promising than others (at least one standard below the mean;  $\geq 33$ ).

Table 3. *Weighted Sample Characteristics for Former Established Cigarette Smokers and Current Established Cigarette Smokers*

	<b>Former Established Cigarette Smokers</b> <i>n</i> = 103	<b>Current Established Cigarette Smokers</b> <i>n</i> = 838
	<i>%</i>	<i>%</i>
Male	42.9	53.9
Female	57.1	46.1
Age: 18-19	10.2	20.9
Age: 20-21	19.6	26.8
Age: 22-23	22.4	28.2
Age: 24-25	47.7	24.1
White Non-Hispanic	59.3	59.1
Black Non-Hispanic	2.8	14.0
Hispanic	23.8	19.0
Other	14.1	8.0
High School or Less	54.0	59.7
Some College	46.0	40.3
Live in Metro Areas	82.5	84.0
High Sensation Seeker	53.2	64.0
Had A Sibling Who Smoked	27.4	46.3
Lived With A Smoker	21.5	63.8
At Least One of Four Closest Friends Uses Tobacco	68.0	90.0

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

### **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 4), the Relative Promise Index did

indicate that the Physical (Health) Effects theme was the most promising of the six, and the Addiction theme was the least promising (Figure 1).

The scale measuring beliefs about Physical (Health) Effects had a moderate percentage to gain (13.7%), a high odds ratio (OR = 4.8) and a moderate percentage to move value (76%; Table 4), and although its value on the Relative Promise Index was not greater than one standard deviation above the mean, it was close to this cut-off. 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 encourage 18 – 25 year old Current Smokers to become Former Smokers (i.e., to quit smoking). Physical (Cosmetic) Effects could also make a promising campaign target. This scale was rated somewhat higher on the Relative Promise Index than the remaining four themes, and it had a moderate percentage to gain value and a high odds ratio (OR = 4.6), indicating a strong association between these beliefs and smoking status. These results indicate that those who believe that smoking negatively affects their appearance—for example, through the development of brittle hair and yellow teeth—are more likely to be Former Smokers than are those who don't believe it (Table 4).

In this sample, the Addiction theme had a very low Relative Promise Index value (26; Figure 1), percentage to gain (1.6%) and odds ratio (OR = 1.3), and a moderate percentage to move value (66%; Table 4), which made the scale not only the least promising among the six FDA-relevant themes, but also the least promising of all 20 themes (Figure 1). This scale had the lowest odds ratio among all the themes, indicating that the primary weakness of this theme was a weak association between these beliefs and behavior, such that believing that smoking leads to addiction was not strongly associated with the likelihood of being a Former Smoker. Therefore, it is unlikely that a campaign targeting these beliefs would be effective at encouraging smoking cessation among 18 – 25 year olds.

### **3.2.2. Other Potential Campaign Themes**

Of the remaining 14 campaign themes, the data suggested that two themes may be particularly promising: Social Perceptions (Smoking) and Mood Effects; however, these results should be interpreted with some caution. Although both of these themes had values on the Relative

Table 4. *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)*

		<b>Behavior Analysis</b>		
	<b>Relative Promise Index</b>	<b>Percentage to Gain</b>	<b>Odds Ratio</b>	<b>Percentage to Move</b>
<b>FDA More Relevant</b>				
Physical (Health) Effects	62	13.7%	4.79	75.5%
Physical (Cosmetic) Effects	54	11.0%	4.56	68.7%
Youth Susceptibility to Health Effects	40	6.1%	2.45	66.4%
Harmful Ingredients: Common Products <sup>a</sup>	38	5.6%	2.79	61.0%
Harmful Ingredients: Health Effects <sup>a</sup>	35	4.7%	2.39	53.4%
Addiction	26	1.6%	1.27	66.0%
<b>FDA Less Relevant</b>				
Social Perceptions (S)	91	23.1%	6.30	87.7%
Mood Effects	87	21.8%	5.49	89.1%
Self-Efficacy	64	14.1%	9.78	65.4%
Expression of Independence (S)	56	11.7%	3.07	84.8%
Peer Pressure from Others	55	11.3%	3.50	77.6%
Expression of Independence (NS)	53	10.7%	4.00	70.1%
Endangering Others	48	9.0%	3.33	71.7%
Impact on Sports	48	9.0%	4.10	63.4%
Social Perceptions (NS)	47	8.4%	2.51	80.0%
Injunctive Social Norms from Peers	45	7.9%	2.02	93.5%
General Social Norms (NS)	43	7.1%	2.09	87.3%
Cost of Smoking	39	6.0%	3.29	54.5%
Injunctive Social Norms from Parents	39	6.0%	1.88	83.5%
General Social Norms (S)	29	2.6%	1.39	83.8%

*Note.*  $n = 939$  (weighted sample). Relative Promise Index is a standardized value that transforms the raw percentage to gain values into standardized values. (S) belief items referred to the consequences of smoking; (NS) belief items referred to the consequences of not smoking.

<sup>a</sup> 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).



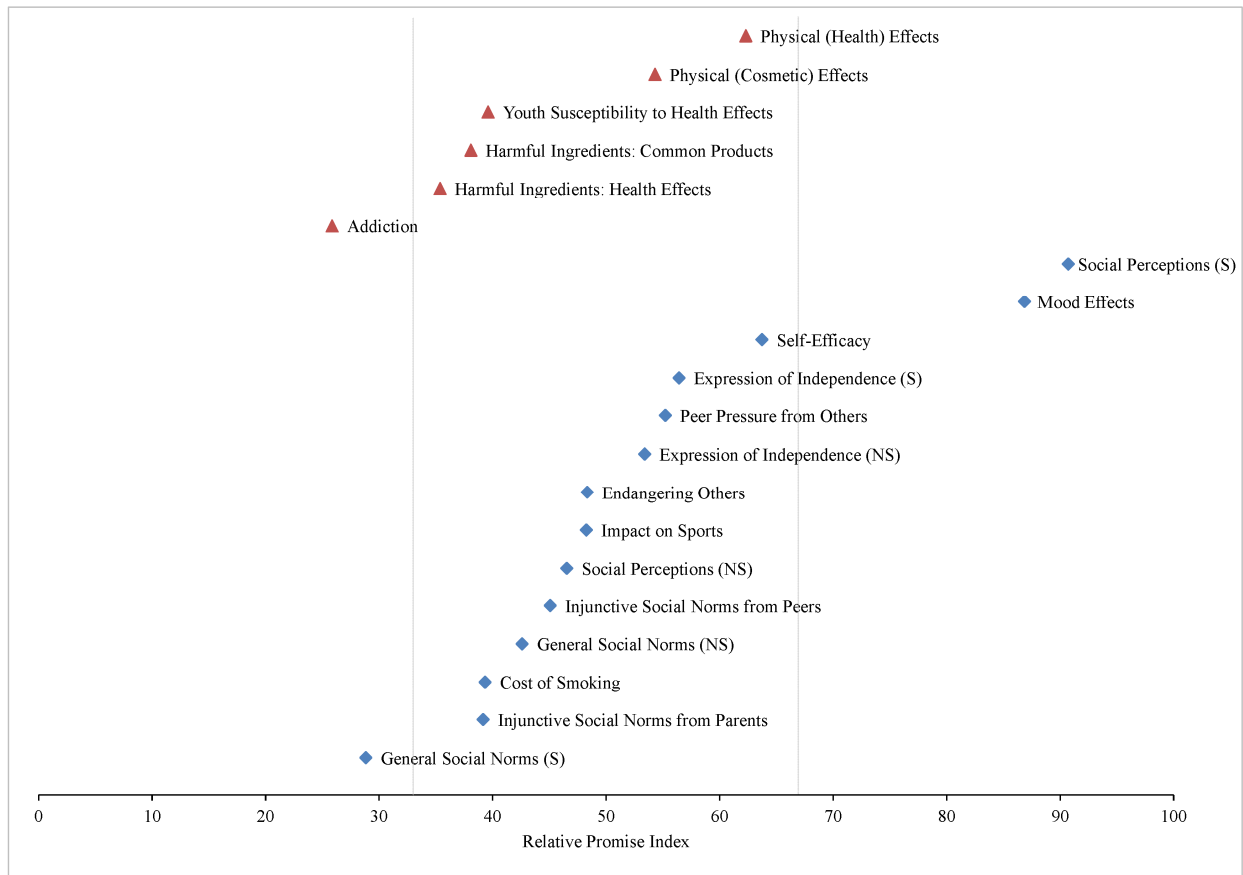


Figure 1. Relative Promise Index values for the 20 message themes. Red triangles next to the theme labels indicate that this theme is one of the six campaign themes most relevant to the FDA's regulatory authority; blue diamonds next to the theme labels indicate that this theme is one of the 14 campaign 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.

Promise Index that were greater than one standard deviation above the mean (Figure 1), along with high percentages to gain and odds ratios, they also had particularly high percentage to move values (88% and 89%, respectively), indicating that only very few respondents (i.e., 12% and 11%, respectively) endorsed these beliefs (Table 4). In the case of these two themes, it is likely that this low level of endorsement reflects respondents' own experiences with smoking, such that it is unlikely that a mass media campaign could easily change these beliefs. For instance, the

Social Perceptions (Smoking) theme is comprised of beliefs about the likelihood that smoking would make others perceive the individual as uncool, unattractive, unpopular and so on. If the smoker has not already experienced such evaluations, or has even received feedback in the opposite direction, then it is unlikely that a campaign could convince them that these consequences are likely to occur. A similar effect of prior experience among smokers may also exist for the Mood Effects beliefs. Therefore, despite the strong associations between these themes and smoking status, it is unlikely that a campaign targeting either of these themes would be particularly effective at promoting smoking cessation.

In addition to the Addiction scale, which was the least promising theme overall, we also identified one other less promising campaign target: General Social Norms (Smoking). This scale had a value on the Relative Promise Index that was lower than one standard deviation below the mean, along with a low percentage to gain value (2.6%) and a low odds ratio (OR = 1.4), indicating that believing that smoking is unlikely to make them more like everyone else were not strongly associated with the likelihood of being a Former Smoker.

### **3.3. Additional Findings**

Unlike in the other versions of this report (for Prevention Campaigns and Stop Progression Campaigns), we were unable to conduct additional analyses examining whether the promise of each campaign theme varied by demographic characteristics. Overall, the Former Smoker group was comprised of only 101 respondents, meaning that any analyses at the sub-group level would have been using only very small numbers of respondents and we would not have been confident in the stability of these results.

#### **3.3.1. Less Promise of Social Norms Themes**

Smoking-related social norms were represented by four different message themes. None of these themes had a particularly high value on the Relative Promise Index: Injunctive Social Norms from Peers (45); General Social Norms (Not Smoking) (43); Injunctive Social Norms from Parents (39); and General Social Norms (Smoking) (29). These results indicate that norm-related beliefs are not likely to make promising campaign themes aimed at encouraging smoking cessation among 18 – 25 year olds. Furthermore, even the two best performing social norms

themes—Injunctive Social Norms from Peers and General Social Norms (Not Smoking)—had particularly high percentage to move values (94% and 87%, respectively), indicating that very few respondents (i.e., 6% and 13%, respectively) endorsed these beliefs (Table 4). This low level of endorsement might reflect the fact that the respondents had not experienced disapproval of smoking from their peers and also had not perceived that they would be doing what others their age were doing if they did not smoke. It is unlikely then that such campaign messages could convince current smokers that these consequences are likely to occur.

#### **4. Conclusions**

Of the six potential campaign themes that we identified as being relevant to the FDA’s regulatory authority, Physical (Health) Effects was identified as particularly promising, and there was evidence that Physical (Cosmetic) Effects could also be a relatively promising potential campaign target. Addiction was the least promising of the six, and the least promising theme overall. Of the remaining 14 themes, the two that appeared most promising overall (Social Perceptions (Smoking); and Mood Effects) could only be used with caution, given that their particularly high percentage to move values suggest that these beliefs may be contradicted by real world experience and would therefore be particularly difficult to change. There was also some evidence that the General Social Norms (Smoking) theme was less promising than the remaining 14 themes.

While these analyses went some way to identifying the beliefs that distinguish those established smokers who had and had not yet quit smoking (i.e., relied on behavioral status as the outcome variable), there is a risk that the results are driven by a reverse causation effect. Such an effect would mean that once respondents had quit smoking, their beliefs changed as a result of the absence of the smoking behavior, in which case, changing these beliefs would not necessarily increase the likelihood of cessation. Unlike in the other versions of this report, we were unable to overcome this threat to reverse causation by using a measure of behavioral intentions as an alternative outcome measure, given that we did not measure intentions to quit smoking in the current study (because the main purpose of the broader study was to identify potential themes for a smoking prevention campaign).

It is important that all of these findings are 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 promising 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 Behavior Analysis (Ordered Within Subset from Highest to Lowest Percentage to Gain)*

Belief items were ranked from highest to lowest percentage to gain, and then grouped into quintiles. Percentage to gain values in the first (top) quintile ranged from 11.9 – 25.7%. These are highlighted in bold text in the table. Percentage to gain values in the fifth (bottom) quintile ranged from -3.7 – 4.7%, and these are italicized in the table.

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.

<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
<b>FDA Relevant</b>			
<u>Physical (Health) Effects</u>			
Be able to focus (very unlikely)	<b>14.1</b>	<b>3.66</b>	<b>85</b>
Develop diseases in my toes and fingers	<b>11.9</b>	<b>3.24</b>	<b>83</b>
Keep myself from overeating (very unlikely)	11.7	3.55	83
Have a soothing feeling in my throat (very unlikely)	11.1	3.65	76
Develop circulation problems	10.9	3.40	74
Get sick more easily	10.4	3.43	75
Develop lung cancer	10.1	3.33	74
Need chemotherapy and radiation	9.6	2.56	82
Lose my taste buds	9.6	2.81	78
Develop inflammation in my lungs	9.5	3.10	72
Develop a blood clot in my brain	9.4	2.84	84
Develop high blood pressure	9.4	2.51	81
Develop heart disease	9.0	2.62	76
Develop sexual and/or fertility problems	8.9	2.79	84

<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
Develop throat cancer	8.7	2.41	75
Develop bad coughs and phlegm	8.5	3.48	62
Damage my body	8.3	4.69	60
Stunt my growth	7.6	2.26	82
Die an early death	7.5	2.51	71
Develop mouth cancer	7.5	2.41	80
Clog my arteries	7.1	2.16	78
Become short of breath	7.1	3.98	62
Develop fatal lung disease	6.6	2.17	73
Suffer a stroke	6.4	1.90	83
Have a burning feeling in my throat	5.4	1.77	77
Harm my health	5.1	3.01	54
Be able to deal with physical pain (very unlikely)	5.0	1.87	76
Destroy my brain cells	4.2	1.75	76
Develop headaches	3.0	1.42	79
Develop cancer	1.9	1.38	73
Have difficulty concentrating	1.7	1.22	84
<b><u>Physical (Cosmetic) Effects</u></b>			
Get wrinkles	<b>12.6</b>	<b>4.97</b>	<b>73</b>
Develop uneven skin coloring	<b>12.4</b>	<b>5.08</b>	<b>75</b>
Have a smelly home	<b>12.1</b>	<b>4.12</b>	<b>73</b>
Look gross	<b>12.1</b>	<b>3.79</b>	<b>80</b>
Have a bad taste in my mouth	10.5	4.71	69
Get bad breath	10.2	8.43	57
Have smelly hair and clothes	9.0	4.09	62
Get yellow teeth	7.2	3.18	66
Develop brittle hair	7.0	2.13	79
Get yellow fingers	5.1	1.90	78
<b><u>Youth Susceptibility to Health Effects</u></b>			
Be just as likely to damage my body as an adult smoker would	10.2	4.80	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) <sup>a</sup>	3.5	1.64	70
People my age who smoke every day are just as likely to harm their health as older people who smoke every day (strongly agree) <sup>a</sup>	3.0	1.54	69

<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
<u>Harmful Ingredients: Common Products Framing</u>			
Inhale acetone, which is also found in nail polish remover	6.9	2.55	73
Inhale mercury, which is also found in mascara	6.5	2.43	74
Inhale poisons	6.1	2.62	67
Inhale carbon monoxide, which is also found in car exhaust	5.2	2.34	65
Inhale benzene, which is also found in some types of detergents	5.1	2.03	74
Inhale lead, which is also found in some paints	4.8	1.96	74
Inhale formaldehyde, which is also found in glues and adhesives	4.3	2.00	67
Inhale nicotine	3.9	2.65	48
Inhale arsenic, which is also found in car batteries	3.3	1.64	72
Inhale nickel, which is also found in stainless steel	3.2	1.55	76
Inhale ammonia, which is also found in many household cleaners	3.1	1.57	73
Inhale chemicals	3.1	1.86	56
Inhale tar, which is also used to pave roads and driveways	2.7	1.61	62
<u>Harmful Ingredients: Health Effects Framing</u>			
Inhale arsenic, which damages the heart	10.0	4.43	63
Inhale carbon monoxide, which causes sexual and/or fertility problems	9.0	3.42	66
Inhale benzene, which damages the heart	8.2	2.74	70
Inhale nickel, which makes it hard to breathe	7.7	2.60	70
Inhale mercury, which causes cancer	7.1	2.46	69
Inhale acetone, which makes it hard to breathe	6.9	2.46	68
Inhale tar, which causes lung cancer	6.9	3.34	56
Inhale poisons that damage the body	6.7	2.70	62
Inhale formaldehyde, which harms the lungs	6.2	2.55	61
Inhale chemicals that damage the body	5.7	2.87	54
Inhale nicotine, which causes addiction	5.4	2.37	59
Inhale lead, which causes cancer	5.1	1.93	68
Inhale ammonia, which harms the lungs	4.2	1.80	65
<u>Addiction</u>			
Be controlled by smoking	10.0	3.12	74
Eventually need to smoke even more	9.2	3.30	71
Become addicted to nicotine	3.6	1.84	58

<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
Become addicted to cigarettes	3.2	1.65	56
Be unable to stop smoking when I want to	-3.5	0.56	76
<b>FDA Less Relevant</b>			
<u>Social Perceptions (Smoking)</u>			
Be unable to go to places that don't allow smoking	<b>17.1</b>	<b>5.40</b>	<b>81</b>
Not look confident	<b>16.9</b>	<b>4.54</b>	<b>86</b>
Look intelligent (very unlikely)	<b>15.5</b>	<b>9.26</b>	<b>73</b>
Be sexually/romantically appealing (very unlikely)	<b>15.5</b>	<b>4.81</b>	<b>76</b>
Look unattractive	<b>13.8</b>	<b>4.67</b>	<b>79</b>
Look confident (very unlikely)	<b>12.9</b>	<b>3.96</b>	<b>80</b>
Be unpopular	<b>12.1</b>	<b>2.59</b>	<b>88</b>
Be sexually/romantically undesirable	<b>12.1</b>	<b>2.88</b>	<b>85</b>
Look stupid	<b>11.9</b>	<b>3.56</b>	<b>83</b>
Lose friends	11.5	3.12	90
Look immature	10.9	2.81	85
Look mature (very unlikely)	10.8	2.97	76
Look cool (very unlikely)	10.0	3.67	72
Lose respect from others my age	9.9	2.28	90
Look ridiculous	9.2	2.55	85
Gain respect from my brother(s) and/or sister(s) (very unlikely)	8.5	3.22	66
Look attractive (very unlikely)	7.8	2.35	75
Look uncool	6.7	1.94	86
Lose respect from my brother(s) and/or sister(s)	6.3	1.99	88
Get respect from others my age (very unlikely)	5.0	1.95	79
Gain friends (very unlikely)	4.7	1.69	80
Be able to show others that I'm not afraid to take risks (very unlikely)	3.3	1.50	78
Be popular (very unlikely)	2.9	1.48	70
<u>Mood Effects</u>			
Feel better when I am sad (very unlikely)	<b>21.4</b>	<b>5.86</b>	<b>86</b>
Feel relaxed (very unlikely)	<b>21.4</b>	<b>5.45</b>	<b>91</b>
Feel more comfortable in social situations (very unlikely)	<b>20.9</b>	<b>5.68</b>	<b>83</b>
Feel content (very unlikely)	<b>16.6</b>	<b>3.86</b>	<b>85</b>
Have something to do with my hands (very unlikely)	<b>14.1</b>	<b>3.05</b>	<b>89</b>



<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
Feel less cranky (very unlikely)	<b>13.4</b>	<b>3.12</b>	<b>88</b>
Enjoy life more (very unlikely)	<b>12.8</b>	<b>3.44</b>	<b>82</b>
Be able to forget about my problems (very unlikely)	<b>12.1</b>	<b>3.76</b>	<b>78</b>
Be able to control my anger (very unlikely)	11.4	2.96	86
Feel less bored (very unlikely)	10.0	2.63	84
<u>Self-Efficacy</u>			
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) <sup>b</sup>	<b>14.9</b>	<b>8.02</b>	<b>69</b>
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) <sup>b</sup>	<b>12.8</b>	<b>7.35</b>	<b>66</b>
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) <sup>b</sup>	<b>12.4</b>	<b>8.61</b>	<b>63</b>
<u>Expression of Independence (Smoking)</u>			
Be making my own decisions (very unlikely)	<b>18.2</b>	<b>4.98</b>	<b>89</b>
Have control over my life (very unlikely)	9.0	2.83	85
Show that I am independent (very unlikely)	4.6	1.68	79
<u>Peer Pressure from Others</u>			
Do your friends offer you a smoke? (never) <sup>d</sup>	<b>12.7</b>	<b>3.37</b>	<b>84</b>
Do others your age encourage you to smoke? (never) <sup>d</sup>	2.3	1.51	57
<u>Expression of Independence (Not Smoking)</u>			
Be showing that I am independent <sup>c</sup>	9.9	3.04	77
Be making my own decisions <sup>c</sup>	8.5	2.88	66
Have control over my life every day <sup>c</sup>	7.3	2.85	71
<u>Endangering Others</u>			
Harm children through second-hand smoke	<b>16.1</b>	<b>6.81</b>	<b>73</b>
Harm my future children	<b>12.1</b>	<b>4.19</b>	<b>77</b>
Harm nonsmokers through second-hand smoke	10.8	4.84	70
Harm my friends and family through second-hand smoke	8.9	2.97	74
<u>Impact on Sports</u>			
Do poorly in sports	11.5	3.59	74
Have less energy to play sports	8.5	3.87	65
Lose my breath easily while playing sports	7.9	4.24	60
<u>Social Perceptions (Not Smoking)</u>			

<b>Belief Items (within themes)</b>	<b>Percentage to Gain (%)</b>	<b>Odds Ratio</b>	<b>Percentage to Move (%)</b>
Get respect from others my age <sup>c</sup>	10.5	3.09	78
Be sexually/romantically appealing <sup>c</sup>	10.0	2.64	80
Look attractive <sup>c</sup>	9.4	3.32	74
Look intelligent <sup>c</sup>	9.1	2.67	80
Look mature <sup>c</sup>	8.6	2.60	80
Look confident <sup>c</sup>	6.9	2.11	78
Gain friends <sup>c</sup>	6.7	2.15	87
Gain respect from my brother(s) and/or sister(s) <sup>c</sup>	6.5	2.17	73
Look cool <sup>c</sup>	4.0	1.63	85
Be popular <sup>c</sup>	3.3	1.43	87
<b><u>Injunctive Social Norms from Peers</u></b>			
Others my age will accept it (very unlikely)	<b>25.7</b>	<b>9.04</b>	<b>87</b>
My friends will accept it (very unlikely)	<b>13.6</b>	<b>3.07</b>	<b>90</b>
My friends won't care about it (very unlikely)	9.3	2.43	89
My friends will disapprove	9.0	2.40	87
Others my age will disapprove	4.0	1.51	90
Others my age won't care about it (very unlikely)	-0.1	0.99	93
<b><u>General Social Norms (Not Smoking)</u></b>			
Be more like everyone else <sup>c</sup>	8.3	2.12	89
Be doing what most others my age are doing <sup>c</sup>	5.8	2.03	85
<b><u>Cost of Smoking</u></b>			
Spend more money on doctor and dentist visits	9.0	2.90	74
Have less spending money	6.9	3.53	55
Waste money I could have spent on other things	6.2	4.14	46
Spend thousands of dollars on tobacco products over my lifetime	4.9	2.58	57
Spend hundreds of dollars on tobacco products a year	4.8	3.26	53
<b><u>Injunctive Social Norms from Parents</u></b>			
Get in trouble with my parent(s)/guardian(s)	10.9	2.39	93
My parent(s)/guardian(s) will be upset	6.5	2.02	78
My parent(s)/guardian(s) will disapprove	5.6	2.09	77
<b><u>General Social Norms (Smoking)</u></b>			
Be more like everyone else (very unlikely)	3.2	1.61	80
Be doing what most others my age are doing (very unlikely)	-1.3	0.83	88

Belief Items (within themes)	Percentage to Gain (%)	Odds Ratio	Percentage to Move (%)
<b>Individual Belief Items (not included in any scale)</b>			
Have you tried to convince your friends not to smoke (almost always) <sup>e</sup>	<b>12.6</b>	<b>2.94</b>	<b>90</b>
How often do your brother(s) and/or sister(s) smoke around you (never)	11.5	3.57	93
Influence my brother or sister to smoke	11.0	2.61	95
Have a pleasant taste in my mouth (very unlikely)	7.6	2.91	70
Constantly think about smoking	5.5	1.84	80
Develop a scratchy voice	5.5	1.76	83
My parent(s)/guardian(s) won't care about it	<i>3.4</i>	<i>1.57</i>	76
Get a buzz (very unlikely)	<i>-1.0</i>	<i>0.88</i>	78
Lose weight (very unlikely)	<i>-2.6</i>	<i>0.74</i>	84
Lose my appetite (very unlikely)	<i>-3.7</i>	<i>0.55</i>	82

*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); and italicized values indicate that this belief was ranked in the bottom quintile.

<sup>a</sup> 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*.

<sup>b</sup> 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*.

<sup>c</sup> 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*.

<sup>d</sup> 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*.

<sup>e</sup> 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*.