Appendix E
Construction of Exposure, Outcome, and Risk Score Indices

This appendix discusses the construction of exposure indices for both youth and parents, and outcome indices and a risk score index for youth. The general exposure and specific exposure indices are described in Section E.1. The outcome indices are explained in Section E.2. Finally, the construction of the risk score index is described in Section E.3.

E.1 Exposure Indices

The general exposure index, described in Section E.1.1, is based on questions that ask about exposure to anti-drug media messages through a variety of channels. The specific exposure index, described in Section E.1.2, is based on the specific National Youth Anti-Drug Media Campaign (Campaign) ads being broadcast during the 60 days prior to the respondent's interview. Since each respondent was asked about recall of only a limited number of the ads, responses to the nonsampled ads were imputed for the construction of the specific exposure index if they were eligible for inclusion. Section E.1.3 presents evidence for the validity of the television ad recall measures for youth.

E.1.1 General Exposure Index

The general exposure index captures exposure to anti-drug ads, not limited to Campaign ads, through a wide variety of channels, including movies, TV, radio, and billboards (see Exhibit E-1 for youth questions and Exhibit E-2 for parent questions on general exposure). Note that in each question, the reference period is "in recent months." This wording was used to maintain equivalence to the wording used by the Monitoring the Future surveys in questions about recall of anti-drug advertising.

The responses to these questions were combined in a way that is designed to reflect the total number of ads viewed by the respondent. Each possible response was translated into a certain number of exposures over a 1-month period, as shown in Table E-1, assuming that the average person would mostly refer to the last month in trying to interpret "recent months." The scores for the responses to the four questions in Exhibits E-1 and E-2, respectively, were then added together to create a scale ranging from 0 to a maximum of 180. This scale was categorized into three classes as shown in Table E-2. The categories in Table E-2 were chosen for ease of communication and to produce a reasonable distribution of general exposure within the sample.

Exhibit E-1. Youth questions on general exposure

The next questions ask about anti-drug commercials or "ads" that are intended to discourage ***illicit drug*** use.

D10. In recent months, about how often have you seen such anti-drug ads on TV, or heard them on the radio?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

D11. In recent months, about how often have you seen such anti-drug ads in newspapers or magazines?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

D12. In recent months, about how often have you seen any anti-drug billboards or other public anti-drug ads such as on buses, in malls, or at sports events?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

D13. In recent months, about how often have you seen such anti-drug ads in the movie theaters or on rental videos?

Haven't gone to movies or rented videos in recent months	0
Not at all	1
Less than 1 time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

Exhibit E-2. Parent questions on general exposure

The next questions ask about anti-drug commercials or "ads" that are intended to discourage ***illicit drug*** use.

F1. In recent months, about how often have you seen such anti-drug ads on TV, or heard them on the radio?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

F2. In recent months, about how often have you seen such anti-drug ads in newspapers or magazines?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

F4. In recent months, about how often have you seen any anti-drug billboards or other public anti-drug ads such as on buses, in malls, or at sports events?

Not at all	1
Less than one time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

F3. In recent months, about how often have you seen such anti-drug ads in the movie theaters or on rental videos?

Haven't gone to movies or rented videos in recent months	0
Not at all	1
Less than 1 time a month	2
1 to 3 times a month	3
1 to 3 times a week	4
Daily or almost daily	5
More than 1 time a day	6

Table E-1. Coding of general exposure questions

Response Category	Recoded response
Not at all	0.0
Less than 1 time a month	0.5
1 to 3 times a month	2.0
1 to 3 times a week	8.0
Daily or almost daily	30.0
More than 1 time a day	45.0

Table E-2. Categories for the general exposure index

Category	Label	Value
Less than 4 times per month	Low	1
4 to less than 12 times per month	Medium	2
12 or more times per month	High	3

E.1.2 Specific Exposure Index and Ad Imputation Procedures

The second exposure index is a recall-aided exposure index based on recall of the Campaign ads. A sample of the Campaign ads was shown to each respondent. The sample was limited to ads that targeted the respondent. This means that for youth, only youth ads[1] were sampled; for English speakers, only English ads were sampled; and for Spanish speakers, only Spanish ads were sampled unless they were bilingual, in which case, ads in both languages were sampled. For parents, exposures to TV and radio ads are combined. For youth, only TV exposure is used.[2]

The sampled ads were played on a laptop computer for the respondent. The questions in Exhibit E-3 were repeated for every television and radio ad the respondent was shown.[3] Responses for ads that were eligible for selection but not actually selected for a particular respondent were imputed.

Generally, each respondent was shown up to four television ads and two radio ads, which had broadcast dates during the prior 2 months. In addition, youth and parents may have been shown an ad that had not ever been broadcast to assess tendency to claim recall falsely. African Americans and bilingual Hispanics could be shown up to two additional television ads and two additional radio ads that were targeted to their specific racial/ethnic group. Radio ads were played only to teenagers and parents and not to children aged 9 to 11 years.

[1] Youth were shown youth television, youth radio, and youth ringer ads (i.e., youth ads never aired on television) in Round 1. However, starting in Round 2, every month, youth had a random chance of being selected to see a spill ad (i.e., an ad geared to the parent audience) or a ringer ad. These spill and ringer ads were not used in the calculation of the Specific Exposure Index. Radio ads were not used in the calculation of youth-specific exposure. Radio ads were used in the calculations of parent-specific exposure.

[2] See Chapter 3 for a discussion of the rationale for this decision at Wave 1. Once the decision was made at Wave 1, the algorithm for the index was held steady to allow comparisons with Wave 1.

[3] The questions in Exhibit E-3 refer to youth. Parents responded to similar questions.

Exhibit E-3. Specific ad questions

Television Ads:

D17a. Now we will show some ads that might or might not have been playing on television around here. Have you ever seen or heard this ad? (PLAY TV AD.)

Yes	1	
No	2	(D18a)
REFUSED		(D18a)
DON'T KNOW		(D18a)

D17b. In recent months, how many times have you seen or heard this ad?

Not at all	1	(D18a)
Once	2	
2 to 4 times	3	
5 to 10 times	4	
More than 10 times	5	

Radio Ads:

D23a. Now we will play you some ads that might or might not have been playing on the radio around here. Have you ever heard this ad? (PLAY RADIO AD.)

Yes	1	
No	2	(D24a)
REFUSED		(D24a)
DON'T KNOW		(D24a)

D23b. In recent months, how many times have you heard this ad?

Not at all	1	(D24a)
Once	2	
2 to 4 times	3	
5 to 10 times	4	
More than 10 times	5	

To accurately characterize each respondent's total exposure to all ads on the air for the recall-aided exposure index, the respondent's exposure levels of the nonsampled ads were needed. To assess these viewing levels, if more than four ads were eligible, responses for the nonsampled ads were imputed. The exposure data were complicated by:

- National Survey of Parents and Youth (NSPY) procedures, which specified that different ad selection rules were used for minorities. Since the Campaign had ads targeted at different audience groups (parents or youth) and racial or ethnic groups (general market, African American, or Hispanic), each month a new ad lookup table was transmitted to interviewer laptops with algorithms for determining which ads to show each specific type of respondent.

- Variation in the number of gross rating points (GRPs) purchased for each ad. GRPs are the customary unit for measuring exposure to ads within the advertising industry. If 1 percent of the target population sees an ad one time, the ad earns one GRP (see Chapter 3 for further discussion of GRPs).

As a result, developing a satisfactory index was complex. Simply summing the recall of the sampled ads would have made minorities appear to have been more heavily exposed because they were shown

more ads on average during their interviews. Simply averaging the recall of the sampled ads would have made people who were shown ads with low GRPs appear to be less heavily exposed than those who were shown ads with high GRPs. Imputation for ads not shown to each respondent appeared to be the best approach. Two different imputation procedures were used depending on the total number of times that an ad was sampled during a wave, i.e., a 6-month data collection period. The two procedures used were single-cell hotdeck imputation and n-cell hotdeck imputation. A single-cell hotdeck imputation was generally used when the total number of respondents shown an ad during a wave was 150 or less. When there was more information about the distribution of viewing of an ad (sample size more than 150), the more complex n-cell hotdeck imputation was used. These imputation techniques are described in Hornik et al., (2003).

After imputation, all respondents had answers (either actual or imputed) to the questions shown in Exhibit E-3 for every ad that (1) had been on the air in the 60 days preceding the day of interview and (2) targeted them.

The responses were recoded as shown in Table E-3. These recoded values were then summed across ads to get a total number of exposures. After summation, the resulting scales were broken into the categories shown in Table E-4. In labeling the categories in this scale, the assumption was made that respondents would consider what they had seen in the 2-month period before the interview in response to the request to consider "recent months." Thus the total viewing frequencies were divided by 2 to generate per-month frequencies. The choice of the "recent months" term reflected a decision to maintain the language of the MTF surveys in the absence of clear evidence that a more specific time period would generate better information. In fact, as shown in the validity analysis below, the estimated weekly frequencies based on the 2-month assumed period were quite similar to the purchased GRP estimates for weekly expected exposure, suggesting that this equation of recent months with 2 months has some empirical support. Four levels were chosen for this index instead of the three chosen for the general index because a sizable proportion of the respondents fell in the "None" category.

Table E-3. Recoding of responses to exposure to specific ads

Question: Here is another TV ad. Have you ever seen or heard this ad?	[If yes,] In recent months, how many times have you seen or heard this ad?	Recoded response
No		0.0
Don't know		0.5
Yes	Not at all	0.0
Yes	Once	1.0
Yes	2 to 4 times	3.0
Yes	5 to 10 times	7.5
Yes	More than 10 times	12.5

Table E-4. Categories for the recall-aided exposure index

Category	Label	New value for categorical version
None	None	0
One to less than 4 times per month	Low	1
4 to less than 12 times per month	Medium	2
12 or more times per month	High	3

E.1.3 Measurement Quality of the Specific Ad Recall Measure

The validity of youth television ad recall was assessed in two ways. First, the recall of the ads actually shown on television was compared to the claimed recall of "ringer" ads, i.e., ads played for respondents although they had never appeared on television. Second, the average recall of each shown ad was compared with the total advertising time (GRPs) purchased for each ad. Positive correlation between the average recall of specific ads and the GRPs purchased for them would provide supportive evidence for the validity of the recall responses.[4]

The ringer ads that had never been aired were used to estimate the tendency to claim that an ad had been seen when it had not. This validation exercise was undertaken after the first wave of data collection. On average, the ringer ads were "recalled" 11 percent of the time. In contrast, of the 13 real general audience ads, seven had recall rates over 50 percent, four others were between 20 to 40 percent, and only two were between 10 to 19 percent, not dissimilar to the ringer ads. These results give confidence that the ad recall responses do reflect true exposure to a large extent, as do the observed association between recall of ads and GRPs purchased for the ads.

Table E-5 presents the data that were used to estimate the fit between youth recall of a specific ad and the GRP that was assigned to that ad. The first column of the table indicates, for instance, that the ad "Hockey" was shown to 1,145 youth respondents (out of 3,314). It had been on the air 16.35 days of the 60 days preceding the interview for the average respondent. Of the 1,145 respondents who were shown the ad, 51 percent recognized it. On average, these respondents claimed to have seen it 2.59 times "in recent months." Estimated weekly exposure is computed from these data as the total number of times the ad was seen divided by the average number of days the ad was on the air, giving an estimate of exposures per day, and then multiplied by 7 to estimate exposures per week.

Thus, for the "Hockey" ad, the estimated weekly exposure is $7 \times 2.59/16.35 = 1.11$. The final column is obtained from the advertising data reported by the media buy contractor by dividing the total GRPs purchased for the specific ad by the number of weeks the ad was on the air. In the case of the "Hockey" ad, there were a total of 398 GRPs purchased over 6 weeks; therefore, the gross ratings points per week the ad was on the air was 66.33. This calculation was repeated for each of the general market ads. The data in the last two columns, one developed on the basis of the NSPY recall data and the other on the basis of reported GRPs, are remarkably consistent. With the ad as the unit of analysis, the correlation between the values in these two columns is $r=0.81$. Even more, they provide very similar estimates for weekly exposure for each ad, recalling that the GRPs, divided by 100, represent the exposures per person per week.

This is strong evidence for two inferences. First, GRPs matter; they largely define how well youth will recall the television ads. Second, the recall measures, at least when aggregated in this way, are strong measures. They would not be so highly related to weekly GRPs otherwise.

[4] Note that the analysis presented in this section is discussed in the Evaluation of the National Youth Anti-Drug Media Campaign: Second Semi-Annual Report of Findings (2001). This analysis was completed on data collected from November 1999 to May 2000. An updated version of this analysis has been described in Southwell, et al. (2002). While the Southwell, et al. paper used updated data, their substantive conclusions on the assessment of the validity of youth television ad recall are consistent with the analysis described in this section.

Table E-5. Association between recall and GRP estimates

Ad name*	Number of eligible respondents	Number of days aired in 60 days before interview	Proportion who had seen the ad in recent months	Mean number of times ad seen in recent months	Estimated weekly recalled exposure	Gross Rating Points per week ad was on the air**
Mary J. Blige	1,636	35.42	0.60	3.27	0.65	94.80
Brothers	492	33.39	0.69	3.42	0.72	80.80
Andy McDonald	284	15.53	0.51	2.07	0.93	75.25
Howtosay	904	28.92	0.53	2.88	0.70	66.75
Hockey	1,145	16.35	0.51	2.59	1.11	66.33
No thanks	1,137	37.99	0.66	3.50	0.64	62.75
Drugs Kill (Williams sisters)	603	33.57	0.63	2.50	0.52	51.44
Dixie Chicks	560	29.02	0.40	1.59	0.38	43.71
Mother Daughter	492	26.39	0.21	0.60	0.16	21.00
Scatman	426	25.23	0.24	0.93	0.26	20.50
No skill	576	13.39	0.11	0.37	0.19	7.00
Michael Johnson	448	13.44	0.18	0.52	0.27	5.57

*Only English language ads are included in this analysis.

**GRPs are customarily reported on a scale equivalent to 100 times the scale on which the weekly exposure estimates are reported. Thus 94.80 GRPs is equivalent to an expected weekly exposure of 0.948.

E.2 Outcome Indices

Three outcome indices that reflect the assumed theoretical model of campaign effects were developed. These three intermediate outcomes indices were "self-efficacy to refuse marijuana," "attitudes and beliefs about marijuana," and "perceived social norms." As described in Chapter 5, the basic theoretical model underpinning the Evaluation assumed that intentions to use marijuana are influenced by (1) self-efficacy to avoid drug usage; (2) knowledge, beliefs, and attitudes; and (3) perceived social norms. Section 5.2 of Chapter 5 discusses the items used to measure these indices.

For each of the three outcome indices, items were combined to form indices using the same basic approach. First, logistic regression equations were computed to predict the intention to definitely not use marijuana, even once or twice, in the next year. The predictor variables in the regression equations were the items in the index in question. The predicted values from the regressions were then rescaled to have means and standard deviations of 100 to form the index values. This process was straightforward for the self-efficacy index but more complex for the other two indices because of the use of different sets of items for different sets of youth. Table E-6 displays the results from the logistic regression for the self-efficacy items. The new index predicted intentions, but less powerfully than the other two indices (Figure E-1).

The indices for attitudes/beliefs and for social norms were more difficult to construct. For the Attitudes/Beliefs Index, the first step in the process was to model intentions to avoid future use for nonusers in terms of beliefs and attitudes about trial use. This logistic regression model is shown in Table E-7. The second step was to model intentions to avoid future use for nonusers in terms of beliefs and attitudes about regular use. This model is shown in Table E-8. Based on these two models, separate indices were formed for the two random subsets of nonusers. The third step was to equate the

Table E-6. Logistic regression model for intentions to avoid any marijuana use among 12- to 18-year-olds in terms of self-efficacy to refuse offers of marijuana*

Item	Item wording	Values	Value label	Coefficient	Standard error
C9(a)	Certainty of refusing marijuana when at a party where most people are using it	1-3	Somewhat sure, slightly sure, or not at all sure	-0.1805	0.1421
		4	Mostly sure	0.2339	0.1130
		5	Completely sure	-0.0535	0.1166
C9(b)	Certainty of refusing marijuana when a very close friend suggests using it	1-3	Somewhat sure, slightly sure, or not at all sure	-0.0627	0.1530
		4	Mostly sure	-0.1604	0.1110
		5	Completely sure	0.2231	0.1197
C9(c)	Certainty of refusing marijuana when home alone and feeling sad or bored	1-3	Somewhat sure, slightly sure, or not at all sure	-0.6240	0.1402
		4	Mostly sure	-0.0458	0.1221
		5	Completely sure	0.6699	0.1051
C9(d)	Certainty of refusing marijuana when on school property	1-3	Somewhat sure, slightly sure, or not at all sure	0.6551	0.1892
		4	Mostly sure	-0.3183	0.1556
		5	Completely sure	-0.3367	0.1356
C9(e)	Certainty of refusing marijuana when hanging out at a friend's house whose parents aren't home	1-3	Somewhat sure, slightly sure, or not at all sure	-0.8485	0.1527
		4	Mostly sure	-0.1478	0.1118
		5	Completely sure	0.9963	0.1221

* These outcomes indices were developed at Round 1 for sample youth from 12 to 18 years of age. As the sampled youth aged over later rounds, youth passing the age of 18 dropped out of the study, and the original age range was curtailed. By Waves 8 and 9, the age range was essentially restricted to youth 12½ to 18 years of age.

Figure E-1. Marijuana nonuse intention by self-efficacy index

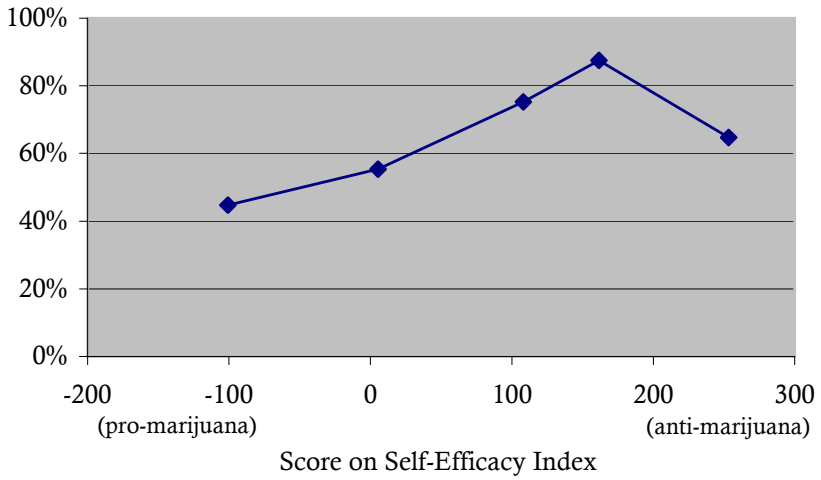


Table E-7. Logistic regression model for intentions to avoid any marijuana use among 12- to 18-year-old nonmarijuana users in terms of personal beliefs and attitudes about trial marijuana use

Item	Item wording	Values	Value label	Coefficient	Standard error
C3a(a)	Trying marijuana would upset parents/caregivers	1-3	Very unlikely, unlikely, or neither likely nor unlikely	0.1524	0.2695
		4	Likely	-0.5901	0.3027
		5	Very likely	0.4377	0.2118
C3a(b)	Trying marijuana would cause legal trouble for youth	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.3179	0.1949
		4	Likely	0.1289	0.2095
		5	Very likely	0.1891	0.2329
C3a(c)	Trying marijuana would cause youth to lose control	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.1752	0.2224
		4	Likely	-0.2441	0.2164
		5	Very likely	0.4193	0.3087
C3a(d)	Trying marijuana would cause youth to use stronger drugs	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.0221	0.2478
		4	Likely	0.3056	0.2823
		5	Very likely	-0.2835	0.3883
C3a(e)	Trying marijuana would cause youth to be more relaxed	1	Very unlikely	0.1361	0.2427
		2	Unlikely	0.0211	0.2468
		3-5	Neither likely nor unlikely, likely, or very likely	-0.1572	0.2036
C3a(f)	Trying marijuana would cause youth to have a good time with friends	1	Very unlikely	0.4546	0.2688
		2	Unlikely	-0.4197	0.2310
		3-5	Neither likely nor unlikely, likely or very likely	-0.0349	0.2180
C3a(g)	Trying marijuana would cause youth to feel better	1	Very unlikely	-0.1994	0.2331
		2	Unlikely	0.1629	0.2189
		3-5	Neither likely nor unlikely, likely, or very likely	0.0365	0.2327
C3a(h)	Trying marijuana would cause youth to be like the coolest kids	1	Very unlikely	0.3274	0.1942
		2	Unlikely	0.2613	0.2122
		3-5	Neither likely nor unlikely, likely, or very likely	-0.5886	0.2038
C4a	Youth perception of trying marijuana in the next year (7-point scale from "extremely bad" to "extremely good")	1		1.4258	0.2460
		2		-0.3259	0.2440
		3		-0.2839	0.3129
		4-7		-0.8160	0.2806
C5a	Youth perception of trying marijuana in the next year (7-point scale from "extremely unenjoyable" to "extremely enjoyable")	1		0.8747	0.2433
		2		0.2961	0.2593
		3		-0.6307	0.2843
		4-7		-0.5402	0.2846

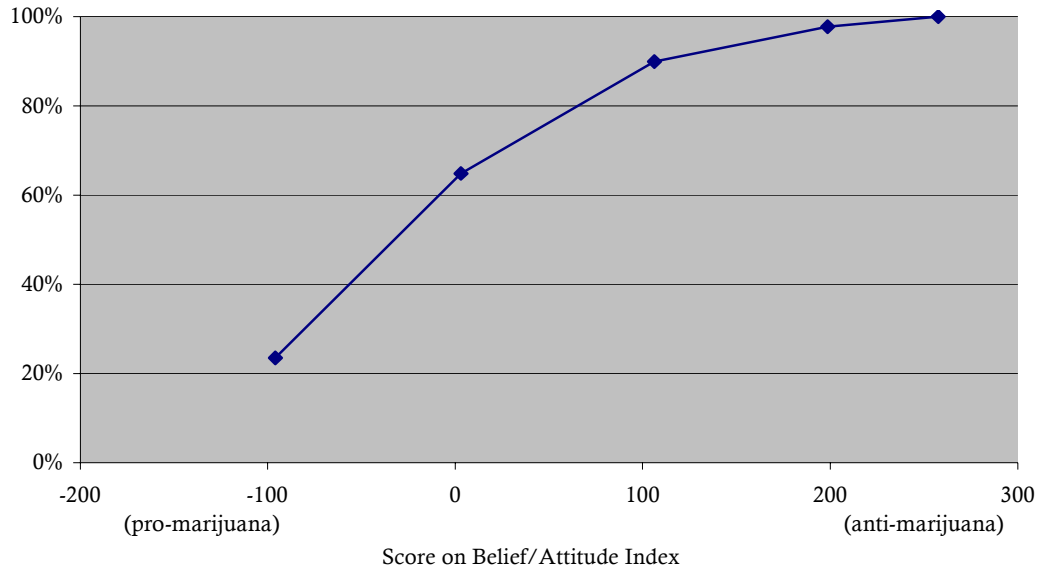
Table E-8. Logistic regression model for intentions to avoid any marijuana use among 12- to 18-year-old nonmarijuana users in terms of personal beliefs and attitudes about regular marijuana use

Item	Item wording	Values	Value label	Coefficient	Standard error
C3b(a)	Regular marijuana use would damage youth's brain	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.1549	0.2164
		4	Likely	-0.0435	0.1858
		5	Very likely	0.1984	0.2141
C3b(b)	Regular marijuana use would mess up youth's life	1-3	Very unlikely, unlikely, or neither likely nor unlikely	0.2318	0.2415
		4	Likely	-0.0884	0.1969
		5	Very likely	-0.1434	0.2395
C3b(c)	Regular marijuana use would make youth do worse in school	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.3141	0.2464
		4	Likely	-0.0044	0.1933
		5	Very likely	0.3186	0.2318
C3b(d)	Regular marijuana use would be acting against youth's moral beliefs	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.2912	0.1988
		45	Likely	0.1467	0.1973
			Very likely	0.1446	0.2104
C3b(e)	Regular marijuana use would cause youth to lose ambition	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.0250	0.2259
		4	Likely	0.1443	0.1977
		5	Very likely	-0.1193	0.2447
C3b(f)	Regular marijuana use would cause youth to lose friends' respect	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.5111	0.1967
		4	Likely	0.1517	0.1983
		5	Very likely	0.3594	0.2349
C3b(g)	Regular marijuana use would cause youth to have a good time with friends	1	Very unlikely, Unlikely	1.0099	0.2677
		2	Neither likely nor unlikely,	-0.6336	0.2172
		3-5	Likely or very likely	-0.3762	0.1953
C3b(h)	Regular marijuana use would cause youth to be more creative and imaginative	1-3	Very unlikely, unlikely, or neither likely nor unlikely	-0.1549	0.2437
		4	Likely	0.1546	0.3294
		5	Very likely	0.0004	0.3749
C4b	Youth perception of regular marijuana use in the next year (7-point scale from "extremely bad" to "extremely good")	1		0.9698	0.2370
		2		-0.2337	0.2386
		3		-0.7086	0.2921
		4-7		-0.0275	0.3042
C5b	Youth perception of regular marijuana use in the next year (7-point scale from "extremely unenjoyable" to "extremely enjoyable")	1		0.7496	0.2271
		2		-0.1493	0.2414
		3		-0.2438	0.2936
		4-7		-0.3565	0.2451

two indices by rescaling them so that they had a common mean and standard deviation on the population of nonusers. The rescaled regular use index was then applied to the items about regular use that were asked of users. The end result of this operation was to create an index for all youth in the dataset that reflects the influence on intentions for avoidance of future use of an amalgam of beliefs and attitudes about both marijuana trial and regular marijuana use. The summed Attitudes/Beliefs Index, as expected, was substantially associated with the intention to use marijuana in the next year.

Figure E-2 presents that relationship graphically. Almost 25 percent of those with the lowest scores on that index said "definitely not" to marijuana use in the next year, while 100 percent of those who were at the highest levels rejected such use.

Figure E-2. Marijuana nonuse intention by attitudes/beliefs index



A parallel process was used for social norms. Table E-9 presents the parameter estimates for the logistic regression model for social norms about trial use and Table E-10 presents the corresponding estimates for social norms about regular use. The Perceived Social Norms Index was substantially correlated with intentions, although the relationship was not quite as strong as that between the Attitudes/Beliefs Index and intention (see Figure E-3).

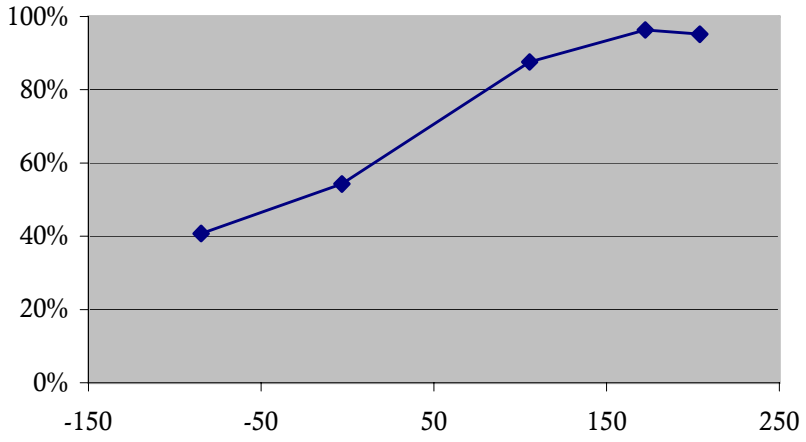
Table E-9. Logistic regression model for intentions to avoid any marijuana use among 12- to 18-year-old nonmarijuana users in terms of perceived social norms about trial marijuana use

Item	Item wording	Values	Value label	Coefficient	Standard error
C6a	Youth perception of most important people's reaction to youth trying marijuana	1	Strongly disapprove	0.3815	0.2229
		2	Disapprove	-0.4784	0.2455
		3-5	Neither approve nor disapprove, approve or strongly approve	0.0970	0.3381
C7a	Youth perception of close friends' reaction to youth trying marijuana	1	Strongly disapprove	1.0315	0.1786
		2	Disapprove	-0.0991	0.1618
		3-5	Neither approve nor disapprove, approve or strongly approve	-0.9324	0.1681
C8a	Youth perception of parents' reaction to youth trying marijuana	1	Strongly disapprove	0.5658	0.2729
		2	Disapprove	0.0545	0.3315
		3-5	Neither approve nor disapprove, approve or strongly approve	-0.6203	0.4227
C10a	Youth perception of how many friends have tried marijuana	1-2	None or a few	0.3854	0.1918
		3	Some	-0.1872	0.2012
		4-5	Most or all	-0.1982	0.2568
C11	Youth perception of how many kids in same grade or same age have tried marijuana	1-2	None or a few	0.3894	0.1764
		3	Some	-0.1868	0.1607
		4-5	Most or all	-0.2026	0.2039

Table E-10. Logistic regression model for intentions to avoid any marijuana use among 12- to 18-year-old nonmarijuana users in terms of perceived social norms about regular marijuana use

Item	Item wording	Values	Value label	Coefficient	Standard error
C6b	Youth perception of most important people's reaction to youth using marijuana regularly	1	Strongly disapprove	0.6495	0.2230
		2	Disapprove	-0.2729	0.2472
		3-5	Neither approve nor disapprove, approve or strongly approve	-0.3765	0.3476
C7b	Youth perception of close friends' reaction to youth using marijuana regularly	1	Strongly disapprove	0.9112	0.1844
		2	Disapprove	-0.0951	0.1722
		3-5	Neither approve nor disapprove, approve or strongly approve	-0.8160	0.1825
C8b	Youth perception of parents' reaction to youth using marijuana regularly	1	Strongly disapprove	-0.0445	0.2371
		2-5	Disapprove, neither approve or disapprove, approve or strongly approve	0.0445	0.2371
C10b	Youth perception of how many friends have used marijuana regularly	1-2	None or a few	0.2339	0.2050
		3	Some	0.0106	0.2192
		4-5	Most or all	-0.2445	0.2814
C12	Youth perception of how many kids in same grade or same age have used marijuana regularly	1-2	None or a few	0.3827	0.1874
		3	Some	-0.1066	0.1726
		4-5	Most or all	-0.2761	0.2353

Figure E-3. Marijuana nonuse intention by social norms index



In addition to the above indices, an additional index was created for youth to summarize personal beliefs about inhalants. As with marijuana, the importance of each item in the index was determined from the parametric model for intentions to avoid inhalant use. The fitted model is shown in Table E-11.

Table E-11. Logistic regression model for intentions to avoid any inhalant use among 12- to 18-year-olds in terms of personal anti-inhalant beliefs

Item	Item wording	Values	Value label	Coefficient	Standard error
C33a(c)	Youth perception of risk of harm when trying inhalants	1-2	No or slight risk	-0.3292	0.1177
		3	Moderate risk	0.0600	0.1066
		4	Great risk	0.2692	0.1249
C33a(d)	Youth perception of risk of harm when using inhalants regularly	1-2	No or slight risk	0.2185	0.1823
		3	Moderate risk	-0.3062	0.1339
		4	Great risk	0.0876	0.1328
C33(c)	Youth approval of others trying inhalants	1	Strongly disapprove	1.3941	0.1511
		2	Disapprove	-0.1367	0.1153
		3-5	Neither approve nor disapprove, approve, or strongly approve	-1.2574	0.1330
C33(d)	Youth approval of others using inhalants regularly	1	Strongly disapprove	0.2942	0.1249
		2	Disapprove	-0.1642	0.1162
		3-5	Neither approve nor disapprove, approve, or strongly approve	-0.1301	0.1412

E.3 Predictors of Marijuana Use and the Development of a Risk Model

In the analyses, youth were stratified into lower and higher risk subgroups. This reflects the expectations of the Campaign implementers who have argued from the start of the Campaign that their target audience was those youth who were at risk of marijuana use.

Stratification into risk subgroups was made on the basis of cross-predicted risk probabilities for marijuana use in the past year. This section briefly presents the underlying logic and the measures used. The sample for the development of the "risk score" (the predicted probability of the undesired event) was the combination of the three waves in Round 1 of the NSPY data collection. (A respondent's risk score is calculated on the basis of the same equation across rounds.) The outcome variable was defined as marijuana use that began or continued in the past 12 months. Youth who had used in previous years but not in the past year were excluded from the development of risk score as were youth who were less than 12 years old at Round 1. The total number of cases in the analysis was 4,804. The list of youth and parent covariates for developing the risk model was gleaned from existing literature on risk factors for adolescent problem behavior in general and for substance use in particular. However, the consideration of what variables were to be included was subject to an additional limitation. No variable that might have been affected by the Campaign directly or indirectly, or that could be a consequence as well as a cause of marijuana use was eligible for inclusion. For example, a well known predictor of risk is the number of friends an individual has who use marijuana. However, there is a possibility that the friend's use may be an effect of the individual's use as well as a cause. Including such variables in the risk model would have created ambiguity in the interpretation of the risk measure, in its relationship to possible Campaign effects. Where it was possible, variables that could have held such ambiguous relationships were constructed so that they would not have such an ambiguous relationship. Thus, youth cigarette and alcohol use as antecedent

covariates are well established in the literature; the measures used here were constructed so as to avoid capturing reciprocal effects between them and marijuana use. Only indicators of whether cigarette or alcohol use was initiated more than 1 year prior to the interview were included. Given the cross-sectional nature of the data, other promising risk covariates were excluded in order to avoid causal ambiguity; for example, marijuana offers, association with deviant peers, and child-parent conflict.

Table E-12 presents the results for the final model.[5] The strongest predictors were: having started smoking prior to the past 12 months, sensation seeking, age, and having started drinking prior to the past 12 months, all of which are youth characteristics and behaviors. To ease interpretation, the last column presents the adjusted odds ratio estimates. Youth who had started using cigarettes prior to the past year had substantially increased odds (odds ratio = 4.43) of using marijuana in the past year compared to children who had not started smoking prior to the past 12 months. Each one-point increase in the child's sensation-seeking tendencies was associated with an increase of 117 percent in the odds of marijuana use in the past 12 months. Each 1-year increase in age was associated with a 42 percent increase in the odds of marijuana use in the past 12 months. Youth who had started drinking prior to the past year had twice the odds of using marijuana in the past year, than youth who had not started alcohol use before that period. Youth living in large urban areas had 31 percent greater odds of having used marijuana in the past year than youth living in towns and rural areas.

Table E-12. Youth and parent covariates for youth past year marijuana use

	Estimate	Standard error	Wald χ^2	Significance level	Odds ratio*
Intercept	-9.9651	.5842	290.95	<.0001	
Youth covariates					
Age (12-18)	.3530	.0323	119.29	<.0001	1.42
Sensation seeking	.7730	.0692	124.83	<.0001	2.17
Started smoking 12+ months ago	1.4890	.1250	141.95	<.0001	4.43
Started drinking 12+ months ago	.7655	.1216	39.62	<.0001	2.15
Urbanicity 1 (urban vs. rural)	.2704	.0815	11.02	.0009	1.31
Urbanicity 2 (suburban vs. rural)	-.0036	.0852	0.00	.9661	1.00
Parent covariates					
Marijuana use in past 5 years	.3361	.1678	4.01	.0451	1.40
Cigarette use in past month	.4127	.1233	11.19	.0008	1.51
Had no drink in past month	-.1727	.1180	2.14	.1433	0.84
Attendance at religious services	-.0943	.0656	2.07	.1502	0.91
Rating of importance of religion	-.0768	.0713	1.16	.2816	0.93
Shares parenting with other adult in household	-.4396	.1186	13.74	.0002	0.64

* Likelihood of a youth using marijuana in the past year.

The strength of parental factors included in the model was, overall, of lower magnitude and some variables did not achieve statistical significance at the conventional level ($p<0.05$) in the final model.

[5] With regard to the analytical procedure, the data set was split into 10 random groups; one of these was randomly dropped, and a logistic regression model was fitted to the remaining 9 groups. The fitted model was then used to assign the risk scores of persons in the omitted group. The logistic regression model was run so that each of the 10 groups was dropped in turn, resulting in a cross-predicted risk score for every person in the sample. In a second step, all 10 models were rerun using only variables that had been found to be significant in any of the previous analyses. Coefficients were averaged across these latter 10 models, and they were the basis for the cross-predicted probability.

Youth from households in which parenting was shared had only 0.64 times the odds of using marijuana in the past year as youth living in single-parent households. Youth whose parent reported tobacco use in the past month had 1.5 times greater odds of using marijuana in the past year than youth whose parent had not smoked cigarettes in the preceding month. Likewise, parental marijuana use was associated with a 39 percent increase in the odds of youth past-year marijuana use.[6]

Across Round 1 of NSPY data collection, the sample used to develop the risk model, only about 11.5 percent of youth reported marijuana use during the preceding year. Given such a low base rate, the risk probabilities for nonusers tend to be fairly low. The average 12- to 18-year-old had about a 12 percent predicted probability of annual marijuana use, with half of the youth having less than a 4 percent risk of use.

About a third of the sample was classified as at higher risk (set at having a risk of use equal to or greater than 8%). While an 8 percent cutoff may seem low, this measure represents a relative risk and not an absolute risk, hence the use of the terms "higher" and "lower." There are, nevertheless, considerable differences in youth reports of marijuana use by risk group. Because youth's age is an important covariate in the risk model, it is important to determine whether the differences by risk group disappear when controlling for age. Table E-13 presents the results for different measures of marijuana use by age and risk subgroups for the first 2 years of the NSPY.

Table E-13. Percent of youth reporting marijuana use by age and risk subgroup

	Youth characteristics		Year 2000 average	Year 2001 average
Use measure	Age group	Risk group	Waves 1 & 2	Waves 3 & 4
Lifetime				
	12 to 13	Higher	34.1	22.4
		Lower	2.1	2.1
	14 to 18	Higher	49.3	52.0
		Lower	5.3	6.9
Past year				
	12 to 13	Higher	23.0	18.4
		Lower	1.5	1.3
	14 to 18	Higher	37.2	36.0
		Lower	3.4	4.9
Past month				
	12 to 13	Higher	11.3	6.2
		Lower	0.4	0.6
	14 to 18	Higher	17.8	18.9
		Lower	1.0	2.4
Regular				
	12 to 13	Higher	5.2	2.3
		Lower	0.0	0.1
	14 to 18	Higher	14.7	14.9
		Lower	0.4	1.8

[6] Covariates that did not make it into the risk measure were wave, youth gender, youth race/ethnicity, parent binge drinking in past 30 days, age of parent, parental education, and annual household income.

Table E-13 shows that marijuana use reported by youth at higher risk tends to be about 10-fold that reported by youth at lower risk. This is true for lifetime, past year, and past month marijuana use, and across age groups. For example, among 12- to 13-year-olds, 0.6 percent of youth at lower risk and 6 percent of youth at higher risk reported past month marijuana use in 2001. Among the older group, a little more than 2 percent of youth at lower risk and nearly 19 percent of youth at higher risk reported past month use in the same period.

In addition, for the delayed-effects analyses (in Chapters 5 and 6) a longitudinal risk score was constructed. The delayed-effects analyses describe the relationship between exposure to the campaign at a *prior* round with an outcome at a *following* round. In the construction of longitudinal risk score, all of the covariates in Table E-12, with the exception of youth's age, are used from the *prior* round; however, age at the *following* round is used. For the delayed-effects analyses, it is important to focus on the risk score from the *prior* round (as opposed to the risk score in the *following* round) because some components of the risk score in the *following* round could be influenced by the Campaign, thus contaminating the implied causal logic of the delayed-effects analyses. However, we make an exception in using youth age from the *following* round in the calculation of longitudinal risk because it is not vulnerable to a concern that the Campaign might affect it.

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