

Use of Tobacco Cessation Treatments Among Young Adult Smokers: 2005 National Health Interview Survey

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In past years, smoking prevalence among young adults (aged 18–24 years) was lower than among adults aged 25 to 44 years, but this pattern is changing.¹ Recent data show young adult smoking rates becoming equivalent to or even greater than those of other adults. For example, the 2004 National Health Interview Survey (NHIS) found that approximately 24% of each age group reported smoking on most or some days.² The 2005 National Survey on Drug Use and Health showed that rates of current cigarette smoking (defined as use of cigarettes in the past month) among adults peaked at 41.2% among young adults aged 21 to 25 years, compared with a rate of 22.3% for persons aged 35 years or older.³

Young adult smokers' quit ratio (the proportion of ever smokers who are former smokers) is lower than that of older smokers.⁴ Although young adult smokers attempt to quit, they are more likely to relapse and less likely to achieve long-term abstinence compared with older smokers.⁵ Evidence-based treatments can improve cessation rates among young adult smokers. Although few smoking cessation studies present outcome data by age, a recent study of the efficacy of telephone counseling found significant treatment effects with both young adult and older adult smokers. Although there were no significant age group differences in outcome, the study's highest success rate was among young adults who received both telephone counseling and pharmacotherapy.⁶

Unfortunately, most smokers, including young adults, fail to use evidence-based treatments to support their quit attempts. The 1986 Adult Use of Tobacco Survey indicated that young adult smokers were least likely to use an assisted smoking cessation method compared with other adults.⁷ Low use of treatment persists: the 2000 NHIS found that only 22.4% of smokers aged 18 years and older who tried to quit in the previous year

Objectives. We compared use of smoking cessation treatments and factors associated with treatment use among young adult smokers and other adult smokers.

Methods. We used data from the 2005 National Health Interview Survey core and cancer control supplement. The sample consisted of 6511 current smokers, of whom 759 were aged 18–24 years. Our analyses were weighted to account for differential sampling probabilities and nonresponse rates. We compared continuous measures using the *t* test; logistic regression was used to obtain odds ratios and confidence intervals. Multiple logistic regression was used to identify correlates of treatment use.

Results. Behavioral treatment use was infrequent among all smokers (4%–5%). Young adult smokers were less likely than other smokers to use pharmacotherapy (18% vs 32%). Correlates of pharmacotherapy use for young adult smokers were receiving advice from a health care provider, heavier smoking, and higher educational attainment. Compared with other smokers, young adult smokers were less likely to have received advice to quit from a health care provider (49% vs 60%).

Conclusions. Evidence-based tobacco cessation treatments are underused by young adult smokers. (*Am J Public Health*. 2007;97:1464–1469. doi:10.2105/AJPH.2006.103788)

reported using any cessation aids, and those who did use cessation aids were more likely to use pharmacological (21.7%) than behavioral (1.3%) treatment.⁸ Insurance status (private or military), advice from a health care provider to quit smoking, and smoking a greater number of cigarettes per day (more than 7) were associated with treatment use. The 2000 NHIS analysis did not directly examine differences in treatment use between young adult and other adult smokers.

In 2003, data from the National Youth Smoking Cessation Survey on current smokers aged 16 to 24 years was used to assess the use of quitting methods among smokers who had tried to quit at least once in their lifetime.⁹ Ever using pharmacotherapy ranged from 0.2% (nicotine spray) to 17.4% (nicotine gum), and ever using behavioral treatment ranged from 0.7% (support group) to 4.8% (counselor). Twenty percent reported ever talking with a health professional as a quitting method. Because the 2003 study did not examine correlates of treatment use or describe use of treatment during a recent quit attempt, direct comparisons

with data from the 2000 NHIS survey were not possible.

We directly compared the use of smoking cessation treatments among young adult smokers (aged 18–24 years) and the rest of the adult smoking population and examined correlates of treatment use for each age group.

METHODS

Data

We used data from the 2005 NHIS. A complete description of the survey is available elsewhere. Briefly, the NHIS is an annual multipurpose health survey that uses a multistage sample designed to represent the civilian noninstitutionalized population of the United States.¹⁰ The survey comprises a basic (core) survey and 1 or more supplements. The core survey includes questions on demographic characteristics (gender, age, education, employment, race, and ethnicity), height and weight, tobacco use, alcohol use, physical activity, mental health status, and insurance status. The 2005 survey included a cancer control supplement with a section on tobacco

use that included questions about motivation to quit, quit attempts, and use of a variety of tobacco cessation treatments.

Adults were sampled within families that were sampled within households. The interviewed adult sample for 2005 consisted of 31 428 persons aged 18 years and older. The conditional response rate for the adult sample was 80.1% of persons identified as eligible; the final response rate, calculated as the overall family response rate (86.1%) multiplied by the sample adult response rate (80.1%), was 69%.

Tobacco-Related Measures

Current smokers were respondents who indicated that they had smoked 100 or more cigarettes in their lifetime and that they currently smoked cigarettes every day or some days. To assess motivation to quit smoking, current smokers were asked a yes or no question indicating whether they would “like to completely quit smoking cigarettes.” Quit attempts in the past year were assessed with a single yes or no question that asked current smokers whether they had stopped smoking for more than 1 day “because you were trying to quit smoking.”

Current smokers who reported a quit attempt in the past 12 months were asked a series of yes or no questions about trying any of the following treatments: nicotine gum; nicotine patch; other nicotine products (nasal spray, inhaler, lozenge, or tablet); prescription pill (Zyban, bupropion, or Wellbutrin); telephone help line or quit line; stop-smoking clinic, class, or support group; one-on-one counseling; help or support from friends or family; the Internet, books, pamphlets, videos, or other materials; or acupuncture or hypnosis.

In addition to these specific treatments, we created 3 summary variables: any evidence-based behavioral treatment (yes to telephone help line, stop-smoking clinic, or one-on-one counseling), any pharmacotherapy (yes to nicotine gum, patch, other nicotine product, or prescription pill), and both behavioral and pharmacotherapy treatment.

Other Measures

Because previous studies reported associations between cessation treatment participation and health professional advice, insurance

status, mental health status, and healthy lifestyles, we included 6 additional measures.^{8,11,12}

- advice from a health care professional to quit, identified by asking adults who indicated that they had seen a doctor or other health professional in the past year yes or no questions about whether they were asked by the provider about tobacco use or advised to quit smoking;
- insurance status, determined by a yes or no question on the family core survey about whether the respondent was covered by any type of health insurance;
- body mass index, calculated as the respondent’s self-reported weight in kilograms divided by self-reported height (without shoes) in meters squared;
- alcohol consumption, classified as any use in the past 12 months and self-reported frequent binge drinking (defined as consuming 5 or more drinks in 1 day) at least 12 times in the past year;
- leisure time physical activity, categorized as self-reported vigorous leisure time activity for at least 20 minutes, 3 days per week, or self-reported moderate leisure time activity for at least 30 minutes, 5 times per week; and
- mental health, determined with a 6-item scale of symptoms of psychological distress during the past 30 days; severe psychological distress was defined as a composite score of 13 or higher.¹³

Data Analysis

All analyses were weighted to account for differential sampling probabilities and nonresponse rates. The weights included poststratification adjustments for age, race/ethnicity, and gender based on Census Bureau population control totals. To adjust standard errors and confidence intervals for the survey design, we conducted all analyses with SAS version 9.1 (SAS Institute Inc, Cary, NC): PROC SURVEYFREQ was used to conduct bivariate comparisons of distributions; the *t* test under PROC SURVEYMEAN was used to compare weighted means for continuous measures; and PROC SURVEYLOGISTIC was used for multivariate analyses of associations. Odds ratios and confidence intervals were calculated

with the age group of 25 years and older as the reference.

We assessed factors associated with evidence-based treatment in 2 analytic stages. The first analysis used multiple logistic regression to identify variables associated with treatment use within the subsample of young adult smokers. A second analysis included the same variables in a logistic regression model that included all smokers regardless of age, along with interaction terms for age with each of the variables. This allowed us to test whether factors associated with treatment use in young adults were associated with treatment use more generally among smokers or whether the associations were age specific.

RESULTS

General Characteristics of Smokers

Of the 31 428 persons aged 18 years and older who completed the survey, 13 285 (42%) reported smoking at least 100 cigarettes in their lifetime. Of these, 6511 (21% of total) reported current smoking and were used as the analytic sample for this study. Within this group, the prevalence of current smoking was 24% among young adults and 20% among adults older than 24 years.

Table 1 shows a sequence of bivariate analyses summarizing selected demographic characteristics, other health behaviors, and health status characteristics by age group for the smokers in our sample and presents the results of statistical tests on the differences in these variables between younger and older smokers. There were no differences between the 2 age groups in race, gender, or rates of serious psychological distress in the past month. The majority of smokers were non-Hispanic Whites and slightly fewer than half were women. Serious psychological distress was reported by 5% to 6% of respondents. The vast majority had at least a high school education. Young adult smokers more frequently reported engaging in both vigorous and moderate leisure time physical activity than did other adult smokers, although rates of vigorous and moderate leisure time physical activity were low for both groups (range: 13%–26%). The majority of smokers reported consuming alcohol in the past year, with more young adult than older adult

TABLE 1—Selected Demographic Characteristics, Other Health Behaviors, and Health Status Characteristics of Smokers: National Health Interview Survey, 2005

	Young Adults, Aged 18–24 y	Older Adults, Aged ≥ 25 y	OR (95% CI) ^a
Total Sample	759	5752	0.92 (0.74, 1.13)
Race, ^{b,c} %			
Non-Hispanic White	73.0	74.6	
Non-Hispanic African American	9.5	11.7	
Hispanic	12.8	9.4	
Asian/Pacific Islander	3.3	2.2	
Other	1.5	2.1	
Gender, % women	42.5	45.5	0.89 (0.73, 1.07)
Employment, % full time	53.9	60.6	0.76 (0.62, 0.93)
Educational attainment, % ^d			0.79 (0.70, 0.89)
Did not graduate high school	25.1	19.8	
High school graduate	38.9	37.6	
Some college	31.4	29.5	
College graduate	4.7	13.1	
Leisure time vigorous physical activity (≥ 3 × wk for 20 min), %	26.4	16.7	1.78 (1.38, 2.31)
Leisure time moderate physical activity (≥ 5 × wk for 30 min), %	18.0	12.9	1.48 (1.15, 1.90)
Alcohol use, %			
Any use in past year	80.9	73.5	1.53 (1.21, 1.92)
Drinking ≥ 5 drinks on one occasion ≥ 12 times in the past year	29.5	18.1	1.89 (1.52, 2.34)
Average BMI, kg/m ²	24.8	27.0 ^e	-2.20 (2.70, 1.69)
Insurance coverage, % yes	59.3	76.2	0.46 (0.38, 0.55)
Serious psychological distress during past 30 d	5.0	6.1	0.81 (0.56, 1.18)

Note. OR = odds ratio; CI = confidence interval; BMI = body mass index. BMI was calculated as the respondent's self-reported weight in kilograms divided by self-reported height (without shoes) in meters squared.

^aORs and CIs calculated from a logistic regression with age ≥ 25 years as the reference group.

^bBecause of rounding, percentages may not add up to 100.

^cNon-Hispanic White versus other race.

^dHigh school or higher education versus less than high school education.

^eMean difference, significant at $P < .001$.

smokers reporting binge drinking. Average body mass index was significantly higher and in the overweight range for the older age group (27.0); for young adult smokers it was just below 25. Significantly fewer young adult smokers reported having insurance coverage (59% vs 76%, respectively).

Smoking History, Motivation to Quit, and Health Care Advice

Table 2 provides descriptive information and tests of differences between age groups for variables related to smoking history, motivation to quit, and health care advice among current smokers. Reported age of initiation of smoking was significantly lower for young adults than for smokers who were older than 24 years. Young adults also reported smoking

significantly fewer cigarettes per day than did the older age group. Younger adults were significantly more likely than older smokers to report a serious quit attempt in the past year. The 2 age groups did not differ in motivation to quit, with approximately 70% of both groups saying they wanted to completely quit smoking.

On several measures of addressing tobacco in health care, significantly fewer young adult smokers were exposed to tobacco intervention. Young adults were less likely to have visited a doctor or dentist in the past 12 months (although 74% reported at least 1 visit). Among smokers who made at least 1 health care visit, young adult smokers were less likely than the older group to report being asked about their

smoking by a health professional (58% vs 67%, respectively). Among smokers who were not asked about their smoking status, young adult smokers were also less likely than older smokers to say they were not asked because their health care provider already knew about their smoking (26% vs 45%, respectively). Finally, young adult smokers were significantly less likely than older smokers to report being advised to quit by a health professional in the past year (49% vs 60%, respectively).

Use of Tobacco Cessation Treatment

In Table 3, use of smoking cessation treatments is summarized by age and tests of differences are shown between age groups among current smokers who reported at least 1 serious quit attempt in the past year ($n = 2747$). The most commonly reported treatment for all age groups was support from friends or family. More than one third of young adult smokers reported this strategy (34%). For both age groups, reported use of any evidence-based behavioral treatment was extremely low (range: 4%–5%); no more than 2% reported using specific types of behavioral treatment, such as quit lines, clinics or groups, and one-on-one counseling.

Overall, pharmacotherapy was used more often than was behavioral treatment. However, young adult smokers were much less likely than were the older smokers to report use of any pharmacotherapy (18% and 32%, respectively). This difference is evident for specific types of pharmacotherapy as well, including nicotine gum, the nicotine patch, and bupropion.

Use of other treatment modalities, including books, pamphlets, videos, and the Internet, was also reported infrequently and did not differ across age groups. As shown in the table, less than 1% of young adults reported using hypnosis or acupuncture.

Correlates of Treatment Use

Table 4 presents results of a multiple logistic regression examining the association of selected covariates with the probability of using pharmacotherapy. The final model excluded variables that showed no bivariate association with pharmacotherapy for either age group. These variables included psychological

TABLE 2—Smoking History, Motivation to Quit, and Health Care Advice Among Current Smokers: National Health Interview Survey, 2005

	Young Adults, Aged 18–24 y	Older Adults Aged ≥ 25 y	OR (95% CI) ^a
Total Sample	759	5752	
Age at smoking initiation, mean	16.1	18.0 ^b	-1.83 (-2.09, 1.57)
Amount smoked (cigarettes/day), mean	11.0	15.1 ^b	-4.06 (-5.28, 2.84)
Serious quit attempt in past year (intentionally quit for at least 1 d), %	48.6	41.5	1.33 (1.09, 1.64)
Wanted to completely quit smoking, % yes	72.0	69.0	1.15 (0.93, 1.43)
Visited a doctor or dentist in past 12 mo, %	74.0	81.0	0.67 (0.52, 0.86)
Was asked about smoking by health professional, ^c %	57.7	67.2	0.67 (0.54, 0.82)
Physician knew about smoking, ^d %	26.5	45.1	0.44 (0.30, 0.65)
Was advised to quit by health professional, ^c %	49.0	60.2	0.64 (0.52, 0.77)

Note. OR = odds ratio; CI = confidence interval.

^aORs and CIs calculated from a logistic regression with age ≥ 25 years as the reference group.

^bMean difference; *P* < .001.

^cAmong those who visited a health professional in past year.

^dAmong those whose health professional did not ask about smoking.

TABLE 3—Use of Tobacco Cessation Treatment Among Current Smokers Who Made a Serious Quit Attempt in the Past Year: National Health Interview Survey, 2005

Treatment Use Among Serious Quit Attempters	Young Adults, Aged 18–24 y, %	Older Adults, Aged ≥ 25 y, %	OR (95% CI)
Total Sample	387	2360	
Behavioral treatment			
Telephone quit line	0.8	1.6	0.48 (0.15, 1.50)
Stop smoking clinic, class, or group	2.4	2.3	1.04 (0.43, 2.55)
One-on-one counseling	1.3	2.0	0.63 (0.21, 1.91)
Any behavioral treatment	4.0	4.9	0.81 (0.42, 1.56)
Pharmacological treatment			
Nicotine gum	5.9	12.8	0.43 (0.25, 0.72)
Nicotine patch	12.3	19.9	0.56 (0.39, 0.82)
Other nicotine replacement products	2.2	5.6	0.38 (0.15, 0.92)
Zyban, bupropion, or Wellbutrin	2.6	8.2	0.63 (0.12, 0.74)
Any pharmacotherapy	17.7	32.5	0.45 (0.32, 0.62)
Any behavioral treatment or pharmacotherapy	19.6	33.5	0.45 (0.32, 0.62)
Both behavioral and pharmacotherapy	2.1	3.8	0.55 (0.23, 1.31)
Other treatment			
Support from friends or family	34.3	27.0	1.41 (1.06, 1.88)
Internet	3.6	2.9	1.27 (0.59, 2.70)
Books, pamphlets, videos, or other materials	5.2	7.2	0.70 (0.41, 1.20)
Acupuncture or hypnosis	0.2	2.9	0.06 (0.01, 0.45)

Note. OR = odds ratio; CI = confidence interval.

provider advice to quit smoking. Results are presented separately by age group, and those results for which the test for differential effects (i.e., the interaction by age) was significant are noted.

Being advised by a health care provider to quit had an equivalent and positive association with the use of pharmacotherapy in both age groups—that is, there was no interaction. Heavier smokers in both age groups, regardless of daily or irregular use, were also more likely to seek treatment.

The remaining variables had a somewhat complex pattern of association. Among older respondents, women were more likely than were men to use pharmacotherapy, a difference that did not appear among younger respondents. Also, among older respondents, non-Hispanic Whites were more likely than were non-Whites to use such therapy, but for younger respondents, non-Whites were more likely to use pharmacotherapy. The associations with education were complex because many younger respondents had not completed all their schooling. For all 3 education comparisons, young adults with higher educational attainment were more likely to use pharmacotherapy, whereas education was not associated with pharmacotherapy use among other adult smokers. Finally, the association of insurance coverage with pharmacotherapy use was significant only for the older group.

DISCUSSION

This is the first report using data from the 2005 NHIS to examine use of evidence-based smoking cessation treatment by young adults and to compare young adult treatment use with that of the remaining population of adult smokers. We found that, compared with other adult smokers, young adults were less likely to use all forms of pharmacotherapy. For all smokers, use of pharmacotherapy was reported more often by those who reported receiving advice to quit from a health care provider during the past year and by heavier smokers. Notably, use of evidence-based behavioral treatment was comparable between young adult and older adult smokers, with overall rates of use relatively low. Low-barrier behavioral programs such as quit lines were used by only 1% to 2% of smokers, although

distress, full-time employment, alcohol consumption, age of smoking initiation, some day versus every day smoking, and body mass index. Although a visit to a doctor or dentist

in the past year was also unrelated to pharmacotherapy use, we retained it in the model to allow us to code respondents without a health care visit as not having received health care

TABLE 4—Correlates of Pharmacotherapy Use Among Current Smokers Who Made a Serious Quit Attempt in the Past Year: National Health Interview Survey, 2005

	Young Adults, Aged 18–24 y (n = 387) OR (95% CI)	Older Adults, Aged ≥ 25 y (n = 2360) OR (95% CI)
Woman vs man	0.82 (0.45, 1.50)	1.39 (1.10, 1.76)
Non-Hispanic White vs other ^a	0.43 (0.21, 0.87)	1.62 (1.26, 2.07)
High-school graduate vs non-high school graduate ^b	4.70 (1.55, 14.24)	0.83 (0.59, 1.16)
Some college vs non-high school graduate ^b	4.87 (1.61, 14.74)	1.04 (0.77, 1.42)
College graduate vs non-high school graduate ^b	5.57 (1.09, 28.57)	1.50 (0.98, 2.30)
Health insurance vs none	1.57 (0.78, 3.16)	1.50 (1.10, 2.06)
Health care visit vs none	1.02 (0.33, 3.20)	1.02 (0.68, 1.53)
Advised to quit by health care professional vs none	3.14 (1.50, 6.54)	1.88 (1.45, 2.42)
10 cigarettes per day difference ^c	2.00 (1.22, 3.27)	1.46 (1.28, 1.66)

Note. OR = odds ratio; CI = confidence interval.

^aSignificance of interaction term testing for differences in odds ratios between age groups; $P < .001$.

^bSignificance of interaction term testing for differences in odds ratios between age groups; $P < .01$.

^cAmount smoked was entered as a continuous variable in the regression model. OR and 95% CI were calculated to compare a referent smoker to one who smoked 10 cigarettes per day or less.

given the broad reach of quit lines to the population of smokers, this translates into many thousands of individuals receiving assistance. The quit-line use rates reported here are consistent with other national estimates.^{9,14} Ever using quit lines was 2.1% in the National Youth Smoking Cessation Survey.⁹ A recent study of quit line use in Maine reported 3.4% annual use and noted that young adult smokers were underrepresented among quit-line users in comparison with their prevalence in the population.¹⁵ Other studies indicate that young adult smokers are not underrepresented among treatment seekers.⁶

Approximately 1 out of 5 young adult smokers attempting to quit reported using some form of pharmacotherapy compared with 1 out of 3 older adult smokers. For both groups, the most commonly used treatment was the nicotine patch, followed by nicotine gum. This likely reflects the over-the-counter availability of both of these products over the counter.

Although it is not considered a formal treatment, social support is recognized as one of the active ingredients of evidence-based behavioral treatment.¹⁶ A longitudinal study found that social networks predicted cessation during the transition from adolescence to young adulthood.¹⁷ Two key aspects of social networks cited in the study were marrying a

nonsmoker and experiencing decreases in the number of friends who smoked, because fewer friends began smoking or more quit. Perhaps these types of changes in social networks during young adulthood help explain why young adults were more likely than older adult smokers to report using social support as a cessation aid. Nevertheless, it is encouraging that one third of young adults and more than one quarter of older adult smokers reported using support from friends or family to help them quit smoking.

There are several possible reasons why young adult smokers are less likely than older adult smokers to report using pharmacotherapy treatments to aid their cessation attempts. To the extent that smokers seek such treatment as a last resort after multiple failed unaided quit attempts, we would expect to see less use among young adults who are at an earlier stage in their smoking career. Young adult smokers were less likely to receive advice to quit from health care professionals, who could either prescribe medications or refer them to over-the-counter products. Access to pharmacotherapy may also be limited for young adults, who are less likely to have health insurance that could cover their costs. In addition, more young adults may have false beliefs about the effectiveness or potential harmful effects of effective treatments. For

example, studies show that younger smokers believe that nicotine-replacement treatments can be harmful and erroneously believe that nicotine causes cancer.^{18–20}

The results for use of Internet support for smoking cessation were surprising. Although young adults use the Internet to access health information²¹ and smoking cessation programs are available online, there was virtually no use of Internet cessation programs. Lack of awareness could be a factor, which suggests a need for more online marketing of Internet program availability.

Our findings should be considered in the context of the limitations of a cross-sectional survey that relies on retrospective, self-reported data. We cannot draw any causal inferences from these data. For current smokers, treatment use was only assessed for those who reported achieving at least 24-hour abstinence as part of a serious quit attempt. We do not know about the use of treatment among smokers who may have tried to quit but did not achieve initial abstinence. The survey did not assess the number of serious quit attempts. Thus, for current smokers who made more than 1 serious quit attempt, we were not able to link treatment use to any specific quit attempt during the past year, nor could we know how many quit attempts involved treatment use.

The 2005 National Health Interview Survey has provided us with important information that contributes to a better understanding of treatment use and preferences among young adults. Tobacco cessation among young adult smokers is an understudied area.²² The field is ripe for studies to assess ways of increasing demand for evidence-based treatment among young adult smokers and for rigorous evaluations of treatment effectiveness in this key target population. Continued assessment of treatment use in national surveys is critical so that we can assess changes at the population level that may be associated with national tobacco cessation campaigns. National surveillance will also allow us to assess the effect of increased visibility of treatment resources, including new pharmacotherapies and nationally available behavioral treatments through telephone (e.g., 1-800-QUITNOW) and Web-based (e.g., www.quitnow.gov) portals. ■

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Contributors

S.J. Curry provided overall scientific direction of the study and drafted early versions of the article and made all revisions. A.K. Sporer contributed to the conceptualization of the article and conducted and synthesized the literature review. O. Pugach conducted all of the data analyses. R. T. Campbell supervised the data analysis and drafted sections of the article related to data analysis and interpretation of the multivariate models. S. Emery contributed to the conceptualization of the article and participated in data analysis and interpretation.

Human Participation Protection

No protocol approval was required for this study because we analyzed a secondary data set without key identifiers available to the general public.

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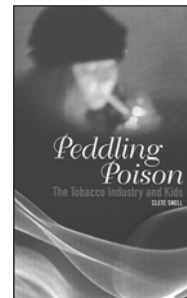
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Peddling Poison

Clete Snell



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the FDA's investigation of the tobacco industry and how those investigations revealed the industry's deceptions and their specific intent to target youth.

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