

North Carolina Health Professionals' Communication with Adolescents About Smoking

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BACKGROUND The middle school and high school years are a time when adolescents are at high risk for initiation of smoking and progression to nicotine addiction. This research examines the prevalence with which North Carolina students receive smoking-related communication from health professionals and how such communication relates to smoking behaviors.

METHODS Data are from the 2009 North Carolina Youth Tobacco Survey (NCYTS), a biennial public and charter school-based survey of students in grades 6–12. The overall response rate was 78.2% ($n = 3,301$) for high school students and 79.2% ($n = 3,805$) for middle school students. Weighted multivariable logistic regression models were used to identify variables that are significantly related to health professionals' communication about smoking and/or advice against smoking.

RESULTS A majority of respondents reported that they had not been asked about or advised against smoking. Middle school and high school students who had tried to quit smoking in the past 12 months were significantly more likely to report having been asked about smoking (OR = 2.00 [95% CI, 1.23–3.28], OR = 1.96 [95% CI, 1.44–2.66], respectively) or advised against smoking (OR = 2.25 [95% CI, 1.13–4.50], OR = 2.02 [95% CI, 1.31–3.14], respectively) than were students who had not tried to quit.

LIMITATIONS This research is based on a cross-sectional survey and is subject to the honesty of the participants. Results may not generalize beyond public and charter school students in North Carolina.

CONCLUSIONS North Carolina health professionals need to increase communication with adolescents in order to sustain the historically low rates of smoking in this age group.

Every year in North Carolina, tobacco use results in 12,200 deaths [1], 181,566 years of potential life lost [2], and \$3.5 billion in lost productivity [1]. Almost 80% of adult smokers report that they regularly smoked cigarettes during their teenage years [3], and longitudinal data indicate that initial experimentation with smoking typically happens between the ages of 11 and 13 years, when students are in middle school [4]. In 2009, every day more than 4,000 individuals under the age of 18 years experimented with cigarettes for the first time, and an additional 1,100 progressed from experimentation to daily smoking [5].

Given that the middle school and high school years are a time when adolescents are at high risk for the initiation and continuation of cigarette smoking, it is essential that they receive appropriate advice and guidance regarding smoking during these years. The Public Health Service's 2008 clinical practice guidelines for treating tobacco use and dependence [6] recommend that clinicians ask all adolescent patients about tobacco use and offer strong prevention and cessation messages; they also recommend providing counseling to adolescent patients who use tobacco, as such counseling can double rates of long-term abstinence. More recent research has shown that screening and advice from physicians is associated with improved attitudes and knowledge about tobacco use among all young individuals and with significantly higher intentions to quit among those who use tobacco [7]. However, most young individuals report

that their physician or dentist has not advised them about tobacco use in the past year [8]. Our research examines data from a survey of North Carolina students to determine both the prevalence with which they report having received communication from a health professional regarding smoking and the relation between such communication and smoking behaviors, including quitting.

Methods

Data come from the 2009 North Carolina Youth Tobacco Survey (NCYTS), which was administered in the fall of 2009. The NCYTS, a biennial public and charter school-based survey of students in grades 6–12, is a surveillance effort of the Tobacco Prevention and Control Branch of the North Carolina Division of Public Health; this survey measures students' use of and attitudes toward various tobacco products, as well as their cessation attitudes and efforts. Participation in the NCYTS is voluntary and anonymous, and school parental permission procedures are followed. A total of 3,805 middle school students and 3,301 high school students completed

Electronically published June 18, 2013.

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N C Med J. 2013;74(3):193–199. ©2013 by the North Carolina Institute of Medicine and The Duke Endowment. All rights reserved. 0029-2559/2013/74302

the 2009 NCYTS (see Table 1). A multistage cluster design and corresponding sampling weights allow results to be generalized to all students in public and charter middle schools and high schools in North Carolina.

Two questions on the 2009 NCYTS addressed smoking-related communication from health professionals: "During the past 12 months, did any doctor, dentist, nurse, or other health professional ask you if you smoke?" and "During the past 12 months, did any doctor, dentist, nurse, or other health professional advise you not to smoke?" Response options for both questions were yes, no, and "don't know/not sure." Multivariable logistic regression models were used to identify variables that are significantly related to health professionals' asking students about smoking and advising students not to smoke. Independent variables included gender (dichotomized as female or male), age (treated as a continuous variable), race (dichotomized as minority [students who self-identify as American Indian or Alaskan Native, Asian, black or Africa American, Hispanic or Latino, or Native Hawaiian or other Pacific Islander] or nonminority [students who self-identify as white]), ever use of cigarettes (dichotomized as yes or no), use of cigarettes in the past 30 days (dichotomized as yes or no), ever use of cigars (dichotomized as yes or no), use of cigars in the past 30 days (dichotomized as yes or no), and quit attempt in the past 12 months (categorized as yes, no, or "did not smoke in past 12 months," with the reference group consisting of those who answered no; see Table 2). All independent variables were entered simultaneously in the logistic regression model. Separate logistic regression models were run for middle school students and for high school students, and only individuals with complete data across all relevant variables were included in the analyses.

Given the study's complex sampling design and corresponding sampling weights, all data were analyzed using SAS survey procedures. Results include weighted percentages, odds ratios (OR), and confidence intervals (CI) and may be generalized to all North Carolina middle and high school students attending public or charter schools. Statistical significance was set at $P < .05$.

Results

A majority of North Carolina students reported that they had not been asked about smoking or advised against smoking by a doctor, dentist, nurse, or other health profes-

sional during the past 12 months (see Table 3). Among North Carolina middle school students, only 16.27% reported that a health professional had asked them about smoking, and only 29.46% reported having been advised not to smoke by a health professional. Only 10.95% responded yes to both questions, and 47.71% responded no to both questions. Among high school students, slightly more than one-third (34.53%) reported that a health professional had asked them about smoking, and slightly less than one-third (30.17%) reported that a health professional had advised them not to smoke. Approximately 20.01% of North Carolina high school students responded yes to both questions, while 42.31% responded no to both questions.

Logistic regression results are shown in Table 4. As student age increased, students were significantly more likely to report having been asked about smoking by a health professional. The OR for middle school students was 1.40 (95% CI, 1.22-1.60), and the OR for high school students was 1.13 (95% CI, 1.01-1.26). However, age was not significantly related to middle school students' having been advised not to smoke (OR = 1.13 [95% CI, 0.97-1.32]). For high school students, increasing age actually decreased their odds of having been advised not to smoke, by 11% for each additional year of age (OR = 0.89 [95% CI, 0.83-0.95]).

Among both middle school and high school students who smoke, having attempted to quit was significantly related to having been asked about smoking and having been advised not to smoke. Middle school students who had tried to quit smoking in the past 12 months were significantly more likely to report having been asked about smoking (OR = 2.00 [95% CI, 1.23-3.28]) and were significantly more likely to report having been advised not to smoke (OR = 2.25 [95% CI, 1.13-4.50]) than were middle school students who had not tried to quit. The results for high school students were similar. Additionally, high school students who had not smoked in the past 12 months were significantly more likely to report having been asked about smoking (OR = 1.93 [95% CI, 1.20-3.09]) and were significantly more likely to report having been advised not to smoke (OR = 1.98 [95% CI, 1.26-3.11]) compared with high school students who had smoked in the past 12 months and had made no attempt to quit smoking.

For high school students, 2 other variables were significantly related to their having been asked about smoking by a health professional, and 1 other variable was significantly

TABLE 1.
Response Rates for the 2009 North Carolina Youth Tobacco Survey

School type	Number of schools sampled	Number of schools participating (%)	Number of students sampled	Number of students participating (%)	Overall response rate ^a
Middle school	99	94 (94.9%)	4,559	3,805 (83.5%)	79.2%
High school	101	95 (94.1%)	3,972	3,301 (83.1%)	78.2%

^aThe overall response rate is the product of the school response rate (the percentage of schools participating) and the student response rate (the percentage of students participating).

TABLE 2.
Weighted Percentages for Independent Variables Used in Logistic Regression Models

Variable	Middle school students Weighted %	High school students Weighted %
Gender		
Female	48.67	48.32
Male	51.32	51.68
Race		
Minority	44.99	42.4
Nonminority	55.01	57.6
Age		
11 years or younger	24.72	0.23
12 years	30.56	0.15
13 years	33.60	0.37
14 years	9.72	20.14
15 years	1.26	25.60
16 years	0.04	25.18
17 years	0.05	22.37
18 years or older	0.04	5.96
Ever use of cigarettes		
Yes	21.07	44.1
No	78.93	55.9
Use of cigarettes in the past 30 days		
Yes	4.31	16.7
No	95.69	83.3
Ever use of cigars		
Yes	14.38	30.7
No	85.62	69.3
Use of cigars in the past 30 days		
Yes	4.63	13.2
No	95.37	86.8
Attempted to quit smoking in the past 12 months		
Yes	5.81	12.03
No	4.37	11.44
Did not smoke during the past 12 months	89.82	76.53

Note. Age is treated as a continuous variable in the logistic regression model. Data are weighted to enable generalization to all students at public and charter middle schools and high schools in North Carolina.

related to their having been advised not to smoke by a health professional. Males were less likely than females to report having been asked about smoking (OR = 0.78 [95% CI, 0.62-0.99]), and high school students who had tried cigar smoking were more likely to report having been asked about smoking by a health professional than were those who had not tried cigar smoking (OR = 1.48 [95% CI, 1.02-2.14]). Finally, high school students who had smoked in the past 30 days were more likely to report having been advised not to smoke by a health professional compared with high school students who had not smoked in the past 30 days (OR = 1.75 [95% CI, 1.24-2.47]).

Discussion

The majority of respondents to the 2009 NCYTS reported that health professionals had not discussed smoking with them in the past 12 months. This finding is unfortunate, given

that research suggests that health professionals such as dentists, nurses, and physicians can have a positive impact on smoking behaviors [7-9]. Physicians' advice to and discussions with teenagers about smoking have also been shown to be associated with changes in attitudes about the social desirability of smoking, teenagers' knowledge about the dangers of smoking, and their intentions to smoke in 5 years [7]. The findings reported here are alarming, because the 2000 National Youth Tobacco Survey showed similar results for adolescent reports regarding smoking-related communication from physicians and dentists [8]. It appears that physicians do not commonly discuss smoking when interacting with their younger patients. Research suggests that providers believe that asking adolescents about smoking can be a barrier to establishing rapport [10], but health professionals should strive to communicate the dangers of smoking and the deadliness of tobacco addiction to adoles-

TABLE 3.
Weighted Percentages and 95% Confidence Intervals for North Carolina
Middle School and High School Students' Self-Reported Communication with
Health Professionals

Asked about smoking by a health professional	Advised not to smoke by a health professional			
	Yes (95% CI)	No (95% CI)	Not sure (95% CI)	Total (95% CI)
Middle school students				
Yes	10.95% (9.02-12.88)	4.03% (3.08-4.99)	1.29% (0.68-1.90)	16.27% (14.09-18.45)
No	14.64% (13.23-16.05)	47.71% (45.23-50.18)	6.17% (4.98-7.36)	68.52% (65.95-71.08)
Not sure	3.87% (3.03-4.71)	2.74% (2.08-3.93)	8.60% (7.59-9.62)	15.21% (13.66-16.76)
Total	29.46% (27.32-31.59)	54.48% (52.13-56.82)	16.07% (14.45-17.68)	100%
High school students				
Yes	20.01% (18.23-21.79)	11.00% (9.61-12.38)	3.52% (2.02-5.01)	34.53% (31.99-37.06)
No	7.46% (6.13-8.80)	42.31% (39.60-45.02)	3.95% (2.99-4.91)	53.72% (51.28-56.18)
Not sure	2.70% (1.87-3.52)	2.61% (2.08-3.14)	6.44% (5.36-7.51)	11.75% (10.19-13.31)
Total	30.17% (28.17-32.17)	55.92% (53.74-58.11)	13.91% (12.16-15.65)	100%

Note. CI, confidence interval.

Data are weighted to enable generalization to all students at public and charter middle schools and high schools in North Carolina.

cents, given the positive impacts of such communication.

On a more encouraging note, some at-risk individuals are being reached. Of particular importance is the finding that middle school and high school students who had tried to quit smoking in the past 12 months were significantly more likely to report having received communication about smoking from a health professional. Furthermore, high school students who chose the answer "did not smoke in the past 12 months" in response to the question about whether they had attempted to quit smoking in the past 12 months were also significantly more likely to report having received communication about smoking from a health professional; thus, it is possible that messages from health care providers may have influenced some high school students who experimented with smoking in the past but had not smoked in the past 12 months.

Research has consistently shown that smoking behavior is related to age [11]; thus, it is not surprising that increasing age is associated with increasing odds that a middle school or high school student will report that a health professional had asked them about smoking. Among high school students, however, increasing age is associated with decreasing odds that a student will report having been advised not to smoke. Primary care providers and adolescent medicine specialists have indicated that insurance issues, time allotted for patient interaction, and more pressing concerns (eg, drunk driving) can limit opportunities to encourage adolescents to quit smoking [10]. Given the positive association between students' quit attempts and their receiving advice

about smoking from health professionals, North Carolina health professionals should consider making cessation messages a priority, particularly since research suggests that many teenagers want to quit smoking [12].

Given the relatively low percentages of middle school students who report smoking cigarettes and cigars, it is not surprising that use of these products by students in this age group is not significantly related to whether they had received smoking-related communication from a health professional. However, the relatively low prevalence of tobacco use among middle school students does not detract from their need to hear clear messages about not smoking. For both middle school and high school students, strong prevention messages delivered early and often are critically important. Some evidence suggests that signs of nicotine dependence can develop even before a young person progresses to daily smoking [13]. Once young people are addicted to nicotine, cessation efforts are more difficult [12], highlighting the crucial role that health professionals can play by providing early interventions for these individuals.

It is possible that students who reported not having been asked or advised about smoking by a health professional had not interacted with a health professional during the past year. However, most North Carolina parents report that their children do have a primary care provider and a regular dentist. In the Child Health Assessment and Monitoring Program (CHAMP) survey [14], a 2009 statewide survey of North Carolina parents, a majority of parents—79.6% of parents of children aged 11-13 years and 76.4% of parents

TABLE 4.
Weighted Multivariable Logistic Regression Results for North Carolina Middle School and High School Students' Self-Reported Communication with Health Professionals

Independent variables	Outcome variables			
	Middle school students		High school students	
	Asked about smoking Odds ratio (95% CI)	Advised not to smoke Odds ratio (95% CI)	Asked about smoking Odds ratio (95% CI)	Advised not to smoke Odds ratio (95% CI)
Age	1.40** (1.22-1.60)	1.13 (0.97-1.32)	1.13* (1.01-1.26)	0.89** (0.83-0.95)
Gender				
Female	1.00	1.00	1.00	1.00
Male	0.90 (0.64-1.28)	1.00 (0.76-1.31)	0.78* (0.62-0.99)	1.15 (0.92-1.45)
Race				
Minority	1.00	1.00	1.00	1.00
Nonminority	0.82 (0.62-1.09)	0.96 (0.78-1.19)	0.91 (0.73-1.14)	1.06 (0.84-1.32)
Ever use of cigarettes				
No	1.00	1.00	1.00	1.00
Yes	1.02 (0.65-1.59)	1.07 (0.76-1.50)	0.87 (0.59-1.29)	0.89 (0.59-1.34)
Current use of cigarettes				
No	1.00	1.00	1.00	1.00
Yes	1.12 (0.61-2.04)	1.77 (0.78-3.98)	1.30 (0.89-1.90)	1.75** (1.24-2.47)
Ever use of cigars				
No	1.00	1.00	1.00	1.00
Yes	1.08 (0.77-1.52)	0.80 (0.59-1.08)	1.48* (1.02-2.14)	1.05 (0.71-1.55)
Current use of cigars				
No	1.00	1.00	1.00	1.00
Yes	1.19 (0.70-2.04)	1.02 (0.62-1.68)	1.38 (0.90-2.10)	1.12 (0.70-1.80)
Attempt to quit smoking in the past 12 months				
No	1.00	1.00	1.00	1.00
Yes	2.00** (1.23-3.28)	2.25* (1.13-4.50)	1.96** (1.44-2.66)	2.02** (1.31-3.14)
Did not smoke in the past 12 months	1.13 (0.56-2.26)	1.72 (0.90-3.30)	1.93** (1.20-3.09)	1.98** (1.26-3.11)

Note. CI, confidence interval.

Age is treated as a continuous variable. Data are weighted to enable generalization to all students at public and charter middle schools and high schools in North Carolina.

*P<.05

**P<.01

of adolescents aged 14-17 years—reported that they had one person whom they thought of as their child's primary care provider. Also, 93.1% of parents of children aged 11-13 years and 89.3% of parents of adolescents aged 14-17 years reported that their child had a dentist or dental clinic where he or she regularly received care. Furthermore, 84.6% of parents of children aged 11-13 years and 79.3% of parents of adolescents aged 14-17 years reported that their child had had a preventive care visit in the past 12 months, and 94.6% of parents of children aged 11-13 years and 86.9% of parents of adolescents aged 14-17 years reported that their son or

daughter had seen a dentist in the past 12 months [14].

There are limitations to this research. The 2009 NCYTS data are cross-sectional in nature. Therefore, significant relationships between variables should not be treated as causal. Also, directionality cannot be assumed. It is possible that middle school and high school students' attempts to quit smoking preceded communication with a health professional. It is recommended that future research specifically address when individuals attempt to quit smoking in relation to when they receive smoking-related communication from a health professional. Also, as results are specific to

middle school and high school students in North Carolina, they may not generalize to young people in other areas of the United States or those not enrolled in public or charter schools. Finally, these data are self-reported and are subject to the honesty of the participants. However, research indicates that school-based questionnaires do produce valid estimates of tobacco use [15], and it is likely that students were honest in their responses to the questions about health professionals' communications about smoking, particularly because "not sure" was included as a possible response for both questions.

Health professionals in North Carolina need to increase their communication with young patients regarding tobacco use, in particular advising them not to smoke or use other types of tobacco. This call to action among health professionals is now more important than ever, given that tobacco prevention in North Carolina has been severely limited in its funding. Since 2003, North Carolina has invested more than \$94 million in tobacco initiatives through the Health and Wellness Trust Fund Commission (HWTFC), and rates of tobacco use among middle school and high school students in North Carolina are at historically low levels [16, 17]. However, the HWTFC was abolished as of June 30, 2011, with the North Carolina General Assembly's passage of the Appropriations Act of 2011 [18], which has resulted in substantially fewer prevention efforts for young people around the state. In order to sustain the low rates of smoking among young people in North Carolina, communication and support from a trusted source is critically important.

Now is the time for North Carolina health professionals to get involved with youth tobacco prevention and cessation. The good news is that a wealth of youth tobacco prevention and cessation information is available for North Carolina health professionals who need additional resources. One source is the American Academy of Pediatrics (AAP) Julius B. Richmond Center, whose mission is "to improve child health by eliminating children's exposure to tobacco and secondhand smoke" [19]. Any health professional can access a variety of tools and resources on the Richmond Center's Web site (<http://www2.aap.org/richmondcenter/psotco/resources.html>), including a slideshow presentation on how to ask and advise teens about tobacco and a webinar on best practices in adolescent smoking prevention and cessation. There also have been recent funding opportunities for training of health professionals related to the promotion of smoking cessation. In July 2012, the Smoking Cessation Leadership Center at the University of California in San Francisco and the Pfizer Medical Education Group made \$2 million available for grants to institutions, health systems, professional associations, state agencies, or organizations offering projects, programs, or initiatives aimed at providing training for health care professionals that will improve the effectiveness of smoking cessation efforts [20]. Finally, with health care reform about to bring major changes to the US health care system, health professionals may now be

able to successfully make the case that providing cessation support for young people should be automatically covered by insurance, because the costs associated with cessation support would be far less than the medical costs associated with smoking-related illnesses. The best way to have healthy adults in North Carolina is to start with healthy children and adolescents. Who better to lead the charge than North Carolina's health professionals? **NCMJ**

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Acknowledgments

Financial support. This work was funded by the North Carolina Health and Wellness Trust Fund Commission (HWTFC) Independent Outcomes Evaluation of Tobacco Initiatives contract. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the commission.

Potential conflicts of interest. All authors have no relevant conflicts of interest.

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