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Patterns and Correlates of Spit Tobacco Use among High School Males in Rural California

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Abstract

Objective—To assess patterns and correlates of spit [smokeless] tobacco (ST) use among high school males in rural California.

Methods—An 18-item, self-administered questionnaire was used to assess ST use among young males in 41 randomly selected high schools in 21 rural counties in California. To ensure confidentiality, students were instructed to seal their completed questionnaire in an attached envelope prior to returning it to the questionnaire administrator.

Results—Overall prevalence of ST use was 9.8 percent, significantly increasing with year in school from 5 percent among freshmen to 15 percent among seniors. ST use was highest among rodeo athletes at 42 percent compared with <6 percent among nonathletes; ST use was significantly higher among smokers (32 percent) who were 2.5-30 times more likely to use ST compared with nonsmokers, depending on race/ethnicity as a result of a significant race/ethnicity × smoking interaction of degree/magnitude. In addition, students who believed there was no, or slight risk of, harm from ST use were significantly more likely to use ST than students perceiving moderate or great risk, depending on race/ethnicity (odds ratios 3.6-13). Among all ST users, 40 percent used ST on at least 5 days in the previous week, 80 percent of those reporting a brand used the brand Copenhagen, and 41 percent (189) used ST within 30 minutes of waking.

Conclusion—Dental public health practitioners, scholars, and policy-makers need to promote dental health through organized community efforts targeting high school male subgroups in rural areas that are at risk for ST-associated adverse health effects.

Keywords

chewing tobacco; prevalence; adolescent; cross-sectional survey; snuff

Introduction

The adverse health effects associated with use of oral snuff and chewing tobacco, also known as spit [smokeless] tobacco (ST), include oral and pharyngeal cancer (1), oral leukoplakia (2-3), periodontal disease (4), hypertension (5), and nicotine addiction (6). Accurate prevalence estimates of ST use among young males are important to assess risk

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and the need for policy, programs, and services through organized community efforts in support of public health dentistry's tobacco control priorities.

Because ST use has been reported to be higher in rural areas compared with urban areas (7-8), and among high school males compared with females, and to vary by race/ethnicity among high school males (9-11), it is critical to provide details related to geographic location, sex, and race/ethnicity when reporting prevalence of ST use among high school students. Failure to do so may lead dental public health policy-makers and practitioners to underestimate the problem and lead to low awareness of male subgroups at risk for ST use and its associated adverse health effects.

ST use among California high school males is not well-defined for any time period (9-12). For example, the 2000 National Youth Tobacco Survey (NYTS), a self-administered questionnaire, used a sample design that permits only national prevalence estimates. That surveillance summary, however, contained data from the State Youth Tobacco Surveys. Findings from these individual state surveys were not stratified by sex, race/ethnicity, or urban/rural location. For California, the State Youth Tobacco Survey for 2000, included in the NYTS surveillance summary, reports that 3.3 percent of California high school youth (combined for males and females, all racial/ethnic groups, and both urban/rural locales) were current ST users (i.e., used ST at least once in the prior 30 days). Moreover, the 2003 California Tobacco Survey (CTS), a random-digit-dial survey, reported that adolescents' "current use" of ST at least once in the prior 30 days declined in California from 0.6 percent in 1999 to 0.5 percent in 2002 (13). This 2003 CTS document, however, only reports data indicating a decline in ST use for males and females combined (ages 12-17 years), and does not stratify this data by high school males, race/ethnicity, or geographic location (urban/rural). Moreover, this report concludes that "In 2002, except for cigars, current use of other tobacco products was confined to less than half a percent of the California adolescent population" (13). In addition, although the 2005 Youth Risk Behavior Surveillance System (YRBSS) reported prevalence of ST use in California separately for high school males, the study sample was limited to high school males living in San Bernardino, CA, and San Diego, CA (5.2 percent and 3.4 percent, respectively) (11), both urban locations. Because California surveillance surveys of ST use tend to lack detail about high school males living in rural locations and detail about race/ethnicity, we surveyed males attending 41 of 73 randomly selected high schools in rural California to assess prevalence, patterns, and correlates of ST use from 2000 to 2004.

Methods

Study Design

This cross-sectional descriptive study was approved by the Institutional Review Board (IRB) (the Committee on Human Research) at the University of California, San Francisco.

Eligibility Criteria

For a high school to be eligible for inclusion in the study, it had to be located in one of 29 totally rural California counties. A rural county was defined as a county with a population density of 250 persons or less per square mile and no township of >50,000 persons (14). In these rural counties, there were 217 eligible high schools (15). For a student to be eligible for the study, the student had to be a male student enrolled in a study high school, have parental consent if under 18 years of age, and sign a statement of informed assent. There were no exclusion criteria for students meeting inclusion criteria.

Sample Selection and Power Analysis

Study investigators contacted the tobacco control coordinator in the County Office of Education (COE) in each of the 29 totally rural counties in California to explain the study and to gain agreement for county participation and their guidance about recruiting study high schools in the county. Of the 29 rural counties contacted for study participation, eight counties refused to participate because of the following reasons: “no school nurse” or “no ST use at our schools,” “not enough time,” “school nurses too busy,” “teachers not willing to give up class time,” “teachers over-worked already,” or “too many programs already in our schools.”

Study high schools in the remaining 21 rural counties that agreed to participate in the study were randomly selected from a list of all public high schools in these counties published in the California Public Schools Directory (15). A sample size of 40 high schools, each with an average enrollment of 150 male students, was estimated to be able to produce a two-sided 95 percent confidence interval (CI) of prevalence within 1.2 percent (CI half-width) of the actual percentage.

Recruitment, Informed Consent, and Student Subject Assent

In the spring of 2001, 2002, 2003, and 2004, COE staff sent a letter to the high school principals in their districts supporting our study. Subsequently, study investigators contacted high school principals by telephone to explain the purpose, methods, benefits, and risks of the study and to gain consent for their high schools’ participation. As an incentive to participate, the study investigators offered to donate US$150 to each participating high school to help support each school’s silver graduation dance at the end of the year. If a school declined to participate, then another randomly selected school replaced it. Forty-one of 73 randomly selected high schools (56 percent of the 217 eligible schools) agreed to participate in the study. This included six continuation high schools which serve students over age 16 years who are at risk for not graduating.

Those high school principals who agreed to participate in the study sent a consent form along with a cover letter from study investigators to parents of all male students at their high school. The cover letter and study consent form were included in the students’ fall registration packets. The cover letter explained the purpose, methods, benefits, and risks of the study. It also provided a toll-free telephone number for parents to obtain answers to their questions from a study investigator.

In fall 2000 (year one of the study), parents were asked to sign and return the consent forms to the principals’ offices by a specific date if they allowed their sons to participate in the study. Only students whose parents returned consent forms permitting study participation and who themselves signed a student informed assent form completed the study questionnaire. Because of a very low return rate of parental consent forms (25 percent) in year one and the noninvasive nature of the study, however, we obtained approval from the study school districts and from the University of California, San Francisco IRB (Committee on Human Research) to gain passive parental consent in subsequent years of the study. Thus, each fall, from 2001 to 2004, parents were sent study consent forms and instructed to sign and return them to the high school principals by a specific date if they did not want their sons to participate in this study. During the study period, fewer than 10 percent of parents refused consent for study participation. Thus, from 2002 to 2004, students whose parents did not return a consent form refusing their participation and who themselves actively assented to participate completed the study questionnaire.

For each high school, a local person (either staff from the COE or the participating high school) was hired and trained by a study investigator as a local study staff person (LSSP).

Each LSSP was sent a standardized training manual and participated in at least one telephone training session with the UCSF study coordinator. The LSSPs went to designated, scheduled classes to explain the purpose of the study, to screen students for eligibility, to gain student informed assent, and to administer the questionnaire.

Questionnaire Administration

High school principals scheduled dates for the questionnaire to be administered. Attached to the questionnaire was a face page where name, current and permanent addresses, and telephone numbers were collected from each study participant to be used for the student incentive drawing (detailed later). To assure confidentiality of responses, the face pages and the questionnaires were coded so that individuals did not have to put their names directly on the questionnaire. After completing the face page, students were instructed to separate it from the questionnaire and place the face page in a pre-addressed prepaid express mailbox placed in the front of the room prior to completing the questionnaire.

Further, to ensure confidentiality of questionnaire responses, an envelope was attached to each questionnaire. Students were instructed to seal their completed questionnaires in the envelope and to deposit their sealed envelopes with questionnaires in the pre-addressed, prepaid shipping box provided in the front of the room. The last student to complete the questionnaire sealed the box, with the help of the LSSP, so that it was ready to mail. When the box was sealed, the LSSP took the sealed box to the principal's office to return to study investigators.

As an incentive to complete the study questionnaire, subjects were offered the opportunity to participate in three drawings for US$50 that would include only students from their school who completed and turned in the questionnaire.

Questionnaire Measures

The two-page, 18-item questionnaire assessed demographic characteristics (i.e., race/ethnicity, year in school), participation in specific sports (i.e., baseball, football, basketball, track & field, wrestling, soccer, rodeo, and other), membership in Future Farmers of America (FFA), and tobacco use in the past 30 days (cigarettes, cigars, dip, and chewing tobacco) with two response options (yes/no). Patterns of ST use (chewing tobacco, snuff, or dip) were assessed by items relating to frequency and duration of use (i.e., number of years used, amount used per day, number of days used in the past week), age of initiation (i.e., age first tried, age use became regular), brand, and time after waking in the morning for the first ST use (within 30 minutes, within 3 hours, or more than 3 hours). ST use within 30 minutes of waking (16) and frequency of ST use (17) have been reported to be measures of dependence in ST users.

In addition, the questionnaire assessed previous quit attempts (yes/no), quitting self-efficacy (i.e., "If you decided to stop using dip or chew completely during the next 2-3 weeks, how confident are you that you can quit for good?" with four levels from "not at all" to "very confident"), perceived risk of harm associated with ST use (four levels from "no risk" to "great risk"), and desire to quit (i.e., "How much do you want to stop using dip/chew?" with three levels: "not at all," "somewhat," "very much").

Data Analysis

We analyzed the prevalence of ST use overall and by year of study (2000-2004), race/ethnicity, year in school, smoking, beliefs about personal risk associated with ST use, type of school, membership in the FFA, and membership on sports teams. As year in school was related to ST use and the distribution of year in school changed by year of study, we

standardized ST use rates each year by the overall distribution of year in school (i.e., 30 percent freshman, 29 percent sophomore, 23 percent junior, and 18 percent senior). Analyses used those year-in-school standardized weights while accounting for schools as clusters using survey sampling software [surveylogistic, surveyfreq, and surveymeans procedures in SAS version 9.1.2 (SAS Institute, Cary, NC, USA)]. Descriptive summaries were performed to describe characteristics of ST use. Characteristics overall and by type of ST used were summarized: mean age first tried, mean age when began using regularly, level of ST use based on the number of days they reported using in the past week (low use = ST use in the past 30 days but not in the past week, moderate use = ST use on 1-4 days in the past week, and heavy use = ST use on 5-7 days in the past week), time to first use after waking, desire to quit, and level of confidence that they could quit (i.e., quitting self-efficacy). Survey logistic regression accounting for school clusters and adjusting for year in study and year in high school tested individual characteristics relating to ST use [race/ethnicity, smoked cigarette/cigar (tobacco) use in the prior 30 days, perceived harm from ST use, and continuation school status]. Smoked tobacco use and perceived harm were highly correlated and both interacted significantly with race/ethnicity. As the model with smoked tobacco and smoked tobacco × race/ethnicity interaction effects fitted better than that for harm and race/ethnicity × harm, smoking was used in the full multivariable model. Thus, the multivariable model simultaneously adjusted for school variables (year in study and continuation school status), demographics (year in school and race/ethnicity), smoking, and race/ethnicity × smoking effects. Because of the interaction, racial/ethnic effects are presented separately by smoking status. As a measure of the association between the variables of interest and the likelihood of ST use, we calculated odds ratios (ORs) and 95 percent CIs. Survey chi-square tests accounting for school clusters were used for categorical measures.

Results

Table 1 shows the number of high schools and study students enrolled by year and the prevalence of ST use weighted and unweighted for overall distribution of year in school while accounting for schools as clusters. Overall, we obtained parental consent and student assent for 4,731 students, for study student participation of 50.4 percent (4,731/9,391), and total participation of 28.3 percent. Four hundred eighty-one students were enrolled in school year spring 2001 of the study using active parental consent. With students using passive parental consent in spring 2002-2004, study student participation increased from 30.0 percent in 2001 to 56.5, 57.2, and 41.2 percent in 2002-2004, respectively. Overall, the unweighted prevalence of ST use during the study was 9.7 percent (95 percent CI: 8.0-11.4). Standardized year in school (weighted) rates increased slightly to 9.8 percent overall, ranging from 11.8 to 8.8. As there was no significant time trend over this time period (weighted or unweighted), remaining results are reported in aggregate.

Table 2 shows characteristics of the overall study sample. Among the participating high school males, most were White in the first 2 years of high school and believed that ST use posed a great health risk. Overall, a greater percentage of study participants smoked cigarettes or cigars (18.5 percent) compared with those who used ST (9.8 percent).

Tables 3 and 4 show prevalence of current ST use (within the prior 30 days) overall and by race/ethnicity, year in high school, smoking, perception of harm associated with ST use, and type of school. Prevalence of ST use ranged from 18.1 percent among African-Americans to 3.6 percent among Hispanics. ST use was significantly higher among smokers than nonsmokers but varied significantly by race/ethnicity with ORs of 7.9 for Whites, 6.0 for Latinos/other Hispanics, 12.3 for Asian/Pacific Islanders, 6.8 for Native Americans, 30.2 for African-Americans, and 25.0 for other/missing (all $P < 0.001$; not shown in tables). Thus,

the interaction was one of degree or magnitude with the effect of smoking being stronger in some groups (rather than one of direction with nonsmokers having higher ST use in some groups). Compared with Whites, ST use in smokers was significantly higher among African-Americans (OR = 2.30) but significantly lower among Latino/other Hispanic smokers (OR = 0.25) and nonsmokers (OR = 0.34) (Table 4).

In addition, prevalence of ST use significantly increased with year in school, ranging from 5.1 percent among freshmen to 15.2 percent among seniors. Prevalence of ST use was higher among smokers (32.0 percent), with smokers more likely to use ST compared with non-smokers for each racial/ethnic group (Table 4). Also, students who believed there was no, or only slight, harm from ST use were more likely to use ST compared with students who perceived moderate or great risk of harm associated with ST use but varied significantly by race/ethnicity. (Results from a multivariable model using harm and race/ethnicity × harm showed similar results: harm effect $P < 0.001$, race/ethnicity effect $P < 0.001$, and race/ethnicity × harm interaction $P = 0.011$). ST use was significantly higher among students reporting no/slight risk from ST use than those reporting moderate/great risk but varied by race/ethnicity with ORs of 3.6 for Whites, 6.2 for Latinos/other Hispanics, 7.8 for Asian/Pacific Islanders, 1.4 for Native Americans, 13.3 for African-Americans, and 5.1 for other/missing (all $P < 0.001$ except Native Americans $P = 0.640$; not shown in Table 4). Continuation school students were not significantly different than mainstream students adjusting for other factors such as year in school.

Table 5 shows prevalence of current ST use by extracurricular activity participation (membership in the FFA organization and participation in specific organized sports). Prevalence of ST use was 41.9 percent among rodeo athletes but only 5.9 percent in students not in FFA or an organized sport. In addition, prevalence of ST use was 17.7 percent for FFA participants.

Overall, among current ST users ($n = 454$): the mean number of dips or chews used per day was 3, about a third (31.5 percent) used within 30 minutes of waking, about two-thirds (66.8 percent) were interested in quitting, almost half (46.7 percent) felt very confident they could quit, and the mean age of initiating regular ST use was 13.4 years (not shown in the table).

Table 6 shows characteristics of ST users by level of ST use. Low users of ST comprised 20 percent of the ST users; moderate ST users and heavy ST users each comprised 40 percent of ST users. Heavy ST users first tried ST and began using it regularly at a significantly younger age than those who were classified as moderate or low users. Those who used both dip and chew were significantly more likely to be heavy users. In addition, compared with light users, heavy ST users tended to use ST significantly sooner after waking: 80 percent of those using it in the first 30 minutes were heavy users. Those with lower self-efficacy and less desire to quit were significantly more likely to be heavy users than moderate or low users.

Discussion

Our findings related to the high prevalence of ST use among rural high school males in California who smoke and/or who participate in rodeos, FFA, and the sports of wrestling, football, and baseball are of great concern. These activities are very popular and encouraged among young males in rural areas. The high ST use prevalence in these male subgroups highlights the need for caution in using state-level overall prevalence of ST use among high school students as a benchmark for policy-makers' assessment of preventive programs needed. Using such an overall benchmark masks higher ST use among at-risk subgroups of rural high school males, erroneously suggesting that ST use is not a problem among

California high school youths. Indeed, in California, and perhaps elsewhere, there is still much to be done to prevent oral disease and promote oral health among rural high school males at risk for ST use. Dental public health practitioners need to assess rural community subgroups to determine risk of ST use and associated oral health effects and to raise policy-makers' awareness of the need to develop and implement targeted preventive programs to influence social norms related to ST use. For example, ST use assessment could be incorporated into community-based health screening programs as ST-associated oral health problems are visually detectable. One study found 79 percent of ST users had observable oral leukoplakia, a precancerous lesion (18), compared with 6 percent among non-ST users. In addition, among ST users, 85 percent of lesions were in the area where ST was placed (18). These oral lesions, when pointed out to users in their own mouths, appear to motivate many ST users to make a quit attempt (19-20). They also may serve to reinforce the benefits of cessation as the lesions often heal quickly if the user refrains from ST use for at least 2 weeks (21).

To date, five randomized controlled trials of ST cessation treatment report (22-26) that an oral cancer screening with feedback about ST-related oral problems, cessation advice, self-help materials, and brief counseling by a dental hygienist significantly promoted ST cessation. Thus, dental screenings provide public health practitioners with a "teachable moment" to discuss oral health effects of ST, relate adverse oral changes to ST use, deliver a brief ST cessation intervention, and refer the client to an external ST cessation program for additional assistance with quitting. In health-related clinical settings, tobacco cessation rates have been reported to double when three to four intervention formats are used in addition to face-to-face counseling (27). Thus, adding a self-help quit guide, referral to a telephone quit line, and/or to a tobacco cessation Web site or community-based cessation program could maximize quitting success. Estimated abstinence rates for self-help and telephone counseling range from 12 to 23 percent depending on the format used (28-29).

The public health service guidelines for brief clinical interventions (30) recommend all individuals seeking health care to be: asked if they use tobacco, advised to quit, assessed for willingness to quit, assisted appropriately based on willingness to quit, and scheduled for follow-up. Public health practitioners could not only deter experimental tobacco use among adolescents by discussing the addiction's dangers but also could provide referral for treatment for highly dependent users.

To maximize ST use assessment among high-risk male adolescent subgroups and provide services on an ongoing basis, dental public health practitioners need to build broad-based coalitions that are community-based, cross-disciplinary, and culturally sensitive to develop integrated comprehensive programs that include oral health. Such coalitions could increase the number and types of settings where oral health assessment and services, including tobacco use prevention and cessation intervention, are provided.

As our study took place for over 4 years and schools that participated each year had different distributions by year in school, we weighted the study by the overall distribution of year in school to allow comparisons across the years of the study. Also, students from the same school were likely to be more correlated than those from different schools. Thus, all analyses used a survey sampling approach to account for the clusters and weights. Unweighted, unclustered analyses produced very similar findings with smaller variances (e.g., narrower CIs) indicating that weighting did not change the relationship between ST use and other factors.

Our overall estimate of 9.8 percent for prevalence of current ST use among rural California high school males is similar to the 11 percent reported in the 2002 NYTS and in the 2003

YRBSS for current ST use prevalence among high school males nationally. Similar to our study, the latter two national studies used school-based, self-administered questionnaires. However, the overall ST use prevalence we found is lower than the 2005 NYTS-reported ST use prevalence among high school males (13.6 percent) nationally (14). In contrast, our 9.8 percent estimate of current ST use among high school males in rural California is much higher than the 0.5 percent current ST use among all California adolescents reported in the 2003 CTS using a random-digit-dial telephone survey. This latter inconsistency may be because of the fact that our findings relate to males in rural areas of California and are based on a written, self-completed questionnaire procedure rather than on a random-digit-dial telephone survey. Evidence suggests that ST use estimates can vary widely depending on mode of data collection (31). A limitation of our study is that the student participation rate was only 56 percent and the total (school × student) participation rate was 28 percent, potentially resulting in bias from respondent schools and students differing from nonrespondents. However, respondents were similar to overall county- and school demographics.

Surprisingly, we found that ST use among African-American high school males living in rural areas of California overall was higher than that of their White male counterparts (18.1 percent versus 10.7 percent), significantly so among smokers. This high prevalence of ST use among African-American youth compared with White youth is inconsistent with overall national data (pooled across urban/rural location), which may reflect level of nicotine addiction or the influence of culture in rural areas (10,11). This potential rural influence on African-American students needs to be further explored. Perhaps community-based protective factors such as cultural norms, racial/ethnic peer support, and church-related factors that may protect African-American male adolescents in urban areas may be less potent in rural areas. As a result, African-American male adolescents in rural areas, compared with those in urban areas, may be more vulnerable to ST use, a behavior traditionally associated with rural White culture (7). Such an explanation is consistent with our previously reported findings regarding ST use among high school baseball athletes in rural areas of California (8). In that study, the prevalence of current ST use by non-White athletes at rural high schools tended to be much higher than that of non-White athletes at urban high schools (22 percent versus 6 percent, respectively). Tobacco control programs targeting high school males in rural areas need to incorporate non-White as well as White positive role models/spokespersons.

Moreover, in our study sample, ST use increased significantly with year in school suggesting the need to intervene early in the high school years. In addition, student participation in organized sports or FFA increased risk of ST use. Davis and colleagues similarly report that high school male athletes are more likely to use ST than nonathletes, but athletes participating in sports characterized by a high level of dynamic exercise (e.g., soccer and basketball) had lower rates of ST use than other athletes (32). Our finding that smokers were 2.5-30 times more likely to use ST compared with non-smokers is consistent with our findings from an earlier study that being a current smoker is the strongest predictor of ST use among male high school baseball athletes in rural areas (8).

Use of ST as a smoking cessation method or as a means to reduce cigarette use among addicted smokers is advocated by some (33). The impact of ST use as such, however, is relatively unknown (34). Promoting ST use as an alternate to smoking might actually increase the uptake of ST use among adolescents who misinterpret the message to mean “smokeless is harmless.” Potential harm at the population level of recommending ST use in smoking cessation/reduction needs to be studied. This need for further study appears to be supported by reports that ST use leads to increased smoking among high school males (35-36) and among young adult males (37).

We found that high school males who perceived little, or no risk of, harm from ST use were significantly more likely to be ST users than high school males who perceived moderate or great risk of harm associated with use (3.6-13.3 more times, depending on race/ethnicity). A number of authors have suggested that perception of harm from smoking may be a consequence from, and not necessarily a cause of, smoking (i.e., smokers frequently deny the potential harm as a way to rationalize smoking) (38-39). In addition, adolescent smokers also have been reported to have unrealistic optimism about their own ability to stop smoking compared with their more pessimistic views about other smokers (40-42). This evidence of unrealistic optimism about smoking risk suggests that ST-using adolescents also may not have adequate knowledge to understand potential ST risks (42).

Dental public health practitioners need to assess ST use among high school males in rural communities, and, if indicated, educate policy-makers that ST use continues to be a problem among male youths in rural areas. Community-based partnerships need to be built to develop and implement ST use prevention programs targeting young males in rural elementary and junior high schools.

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Table 1

Study Enrollment and Prevalence of Current Smokeless Tobacco (ST) Use Overall and by Year

	Schools			Students		Unweighted*,‡		Weighted*,†,§	
	Enrolled	Dropped out	Retained	Eligible	Enrolled	ST use		ST use	
School year	*n*	*n*	*n*	*n*	*n*	%	95% CI	%	95% CI
2000-2001	9	1	8	1,602	481	11.2	7.4-15.1	10.8	6.4-15.2
2001-2002	15	0	15	3,594	2,033	9.0	6.5-11.5	8.8	6.4-11.1
2002-2003	10	0	10	3,036	1,739	10.5	8.1-13.0	10.3	7.9-12.7
2003-2004	9	1	8	1,159	478	7.9	1.6-14.3	11.8	5.6-18.0
Total	43	2	41	9,391	4,731	9.7	8.0-11.4	9.8	8.2-11.5

*Adjusted for school cluster.

†Standardized to overall 2000-2004 year in high school percentages.

‡1 d.f. trend, $P = 0.796$, 3 d.f., $P = 0.707$.

§1 d.f. trend, $P = 0.498$, 3 d.f., $P = 0.684$.

CI, confidence interval.

Table 2

Characteristics of Weighted Study Sample (n = 4,731)

	n	%
Race/ethnicity		
White/Non-Latino	3,190	67.7
Latino/other Hispanic	607	12.9
Other	233	4.9
Asian/Pacific Islander	239	5.1
Native American	175	3.7
African-American	119	2.5
Missing	150	3.2
Year in high school		
Freshman	1,419	30.1
Sophomore	1,364	28.9
Junior	1,065	22.6
Senior	867	18.4
Missing*	16	0.3
Activity participation†		
None	1,499	32.2
Baseball	857	18.2
Football	1,417	30.1
Basketball	956	20.3
Other	883	18.7
Future Farmers of America	719	15.3
Track & field	541	11.5
Soccer	513	10.9
Wrestling	394	8.4
Rodeo	164	3.5
Current tobacco use		
Cigarettes	671	14.2
Cigars	500	10.6
Cigarettes or cigars	872	18.5
Smokeless tobacco (ST)	464	9.8
Cigarettes and ST	279	5.9
Perception of risk associated with ST use		
No risk	196	4.1
Slight risk	317	6.7
Moderate risk	1,433	30.4
Great risk	2,682	56.9
Missing	87	1.8

*Not included in weighted analyses.

†Not mutually exclusive categories (except “None”).

Table 3

Prevalence of Current Smokeless Tobacco (ST) Use in Prior 30 Days Overall and by Demographic Characteristics, Smoking, and Perception of Risk

	n	%	
Overall	**4,715**	**9.8**	**aOR (95% CI)**
Race/ethnicity			χ^2 5 d.f., $P < 0.001$
White/Non-Latino	3,188	10.7	Ref
Latino/other Hispanic	620	3.6	0.31 [0.17-0.54]
Asian/Pacific Islander	231	4.2	0.37 [0.16-0.87]
Native American	173	12.0	1.18 [0.68-2.03]
African-American	119	18.1	1.87 [1.13-3.10]
Other/missing	384	12.5	1.23 [0.86-1.77]
Year in high school			χ^2 3 d.f., $P < 0.001$
Freshman	1,419	5.1	Ref
Sophomore	1,364	9.6	1.98 [1.39-2.83]
Junior	1,065	12.2	2.59 [1.93-3.48]
Senior	867	15.2	3.35 [2.26-4.96]
Smoking status (cigarette or cigar)			χ^2 1 d.f., $P < 0.001$
Smokers	846	32.0	8.55 [6.44-11.4]
Nonsmokers	3,869	4.8	Ref
Perception of harm			
"How much do you think people risk harming themselves if they use dip or chew?"			χ^2 2 d.f., $P < 0.001$
No/slight risk	511	26.0	4.09 [2.88-5.80]
Moderate/great risk	4,116	7.8	Ref
Missing	88	8.9	1.23 [0.70-2.14]
Continuation high school			χ^2 1 d.f., $P = 0.226$
Yes*	204	16.4	0.74 [0.45-1.21]
No	4,511	9.5	Ref

*6 of 41 high schools.

aOR, odds ratio adjusted for calendar year and year in high school; d.f., degree of freedom; CI, confidence interval.

Table 4

Prevalence of Current Smokeless Tobacco (ST) Use in Prior 30 Days Overall and by Demographic Characteristics, Smoking, and Race/Ethnicity × Smoking Interaction Effects

Overall	***n*** **4,715**	**%** **9.8**	**aOR (95% CI)**
Year in high school			χ^2 3 d.f., $P < 0.001$
Freshman	1,419	5.1	Ref
Sophomore	1,364	9.6	1.92 [1.34-2.75]
Junior	1,065	12.2	2.04 [1.54-2.70]
Senior	867	15.2	2.16 [1.40-3.33]
Nonsmokers	Race/ethnicity effect		χ^2 5 d.f., $P < 0.001$
White/Non-Latino	150	5.7	Ref
Latino/other Hispanic	11	2.1	0.34 [0.17-0.68]
Asian/Pacific Islander	4	1.8	0.30 [0.11-0.79]
Native American	9	6.5	1.14 [0.51-2.57]
African-American	3	3.6	0.60 [0.20-1.81]
Other/missing	8	2.9	0.49 [0.23-1.03]
Smokers	Smoking effect		χ^2 1 d.f., $P < 0.001$
	Interaction effect		χ^2 5 d.f., $P = 0.028$
White/Non-Latino	181	33.5	Ref
Latino and other Hispanic	12	11.2	0.25 [0.11-0.58]
Asian/Pacific Islander	6	19.5	0.47 [0.17-1.26]
Native American	12	31.2	3.62 [1.03-12.7]
African-American	18	54.1	2.30 [1.01-5.25]
Other/missing	40	42.5	1.56 [1.08-2.24]
Continuation high school			χ^2 1 d.f., $P = 0.226$
Yes*	204	16.4	1.64 [0.86-3.16]
No	4,511	9.5	Ref

* 6 of 41 high schools.

aOR, odds ratio adjusted for calendar year, year in high school, smoking, race/ethnicity, and race/ethnicity × smoking interaction; d.f., degree of freedom; CI, confidence interval.

Table 5

Prevalence of Current Smokeless Tobacco (ST) Use in Prior 30 Days and 95% Confidence Intervals (CIs) by Extracurricular Activity Participation (FFA Membership and Each Sport)*

	n	%	95% CI
No sport/FFA	1,493	5.9	4.1-7.7
Rodeo	161	41.9	35.1-48.6
Wrestling	399	18.6	13.3-23.8
FFA members	701	17.7	13.7-21.7
Baseball	857	17.3	13.4-21.2
Football	1,416	16.0	12.9-19.1
Track & field	547	12.3	8.4-16.2
Basketball	954	10.6	7.8-13.3
Other sport	888	8.7	6.4-11.0
Soccer	508	5.6	2.6-8.6

*Activities are not mutually exclusive, except for “No Sport/FFA.”

FFA, Future Farmers of America.

Table 6

Characteristics of Smokeless Tobacco (ST) Users by Level* of ST Use (n = 454)

Characteristic	Low (n = 91)	Moderate (n = 181)	Heavy (n = 182)	P value
Mean age first tried (year)	12.8	13.0	10.4	<0.001
Mean age when began using regularly (year)	13.5	14.5	12.7	0.002
Type (%)				
Dip	26.3	41.0	32.8	<0.001
Chew	34.6	60.3	5.1	
Both	10.2	33.5	56.3	
First use after waking (%)				
≤30 minutes	5.7	14.1	80.1	<0.001
Quitting self-efficacy (%)				
Not at all	3.0	29.9	67.1	<0.001
A little	6.5	24.9	68.6	
Somewhat	13.4	43.0	43.6	
Very confident	26.6	46.9	26.5	
Desire to quit (%)				
Not at all	16.1	35.3	48.6	0.082
Somewhat	14.3	42.9	42.8	
Very much	24.1	41.6	34.3	

* Low = use in the prior 30 days but not in the prior week (20% of ST users); moderate = use on 1-4 days in the prior week (40% of ST users); heavy = use on 5-7 days in the prior week (40% of ST users).