

Youth Attitudes and Beliefs Toward Alternative Tobacco Products: Cigars, Bidis, and Kreteks

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Youth use of cigars, bidis, and kreteks has spread as youth cigarette use has declined. This study investigates young people's attitudes toward and beliefs about these alternative tobacco products. The study used data from a convenience sample survey of 5,016 7th- through 12th-grade students in Massachusetts. The cigar attitudes receiving the highest endorsement levels were that cigars smell good and are something different to try, whereas the item receiving the lowest endorsement was that cigars give you a good buzz. The most endorsed bidi attitudes were that bidis look like joints and are something different to try. For kreteks, the most endorsed items were that kreteks smell good and are something different to try. Multivariate analyses found that reporting that these products tasted, smelled good, or were something different to try predicted use. Because the study was conducted with a convenience sample in one state, results do not necessarily generalize.

Keywords: *tobacco; adolescent; adolescent behavior; cigar; bidi; kretek; alternative tobacco; attitude; belief; smoking; gender difference; youth tobacco use*

Young people often experiment with behaviors associated with significant risks including use of illegal substances and other substances, for example, alcohol and tobacco products, that are illegal for youth but legal for adults (Jessor, 1998; Scheier, 2001; Schinke, Botvin, & Orlandi, 1991; Soldz & Cui, 2001, 2002). To design prevention interventions to reduce these risky behaviors, knowledge of attitudes toward these substances has often proven helpful.

Recent years have seen declines in youth use of cigarettes and several illegal drugs (Centers for Disease Control & Prevention [CDC], 2000, 2001; Soldz, Clark, Stewart, Celebucki, & Klein Walker, 2002; Soldz, Kreiner, Clark, & Krakow, 2000). Yet, surveys have shown that a surprising number of youths are experimenting with cigars (CDC, 1997, 2001; Delnevo, Pevzner, Steinberg, Warren, & Slade, 2002; Soldz et al., 2002; Soldz, Huysler, & Dorsey, 2003a) and with both bidis (hand-rolled cigarettes containing tobacco imported from India; CDC, 1999) and kreteks (clove-flavored tobacco cigarettes, often imported from Indonesia; CDC, 2001). For example, the National Tobacco Youth Survey for 2000 reported lifetime prevalence rates for cigars of 19.3% in middle

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school and 41.7% in high school, for bidis of 4.4% in middle and 12.9% in high school, and for kreteks of 3.6% in middle and 12.1% in high school (CDC, 2001).

Use of these products has been associated with serious health risks. Use of cigars has been associated with cancers of the oral cavity, larynx, esophagus, and lung (Baker et al., 2000; LaVecchia, Bosetti, Negri, Levi, & Franceschi, 1998; U.S. Department of Health & Human Services [DHHS], 1982); bladder cancer (Pitard et al., 2001); chronic obstructive pulmonary disease (U.S. DHHS, 1984); and coronary heart disease (Jacobs, Thun, & Apicella, 1999). Cigars contain a substantial amount of nicotine, an addictive drug (Henningfield, Hariharan, & Kozlowski, 1996). Teenage cigar use has also been associated with marijuana use (Stoltz & Sanders, 2000). Bidis have been associated with cancer-causing effects on the body (Yadav & Thakur, 2000), including oral cancers (Sankaranarayanan, Duffy, Day, Nair, & Padmakumary, 1989); laryngeal, esophageal, and liver cancers (Sankaranarayanan, Duffy, Nair, Padmakumary, & Day, 1990; Sankaranarayanan et al., 1991); lung cancer (Gupta, Boffetta, Gaborieau, & Jindal, 2001; Jindal et al., 1982); and stomach cancer (Gajalakshmi & Shanta, 1996). Bidis have also been associated with pulmonary disorders (Shah et al., 2001) and thromboangiitis obliterans, a disease of the blood vessels in the lower extremities (Rahman, Chowdhury, Fukui, Hira, & Shimbo, 2000). Kreteks, which contain the potentially dangerous substance eugenol, have been associated with symptoms such as fluid in the lungs, blood in the lungs, bronchospasm, respiratory tract infections, and other severe lung injury (CDC, 1985; Council on Scientific Affairs, 1988; Guidotti, Laing, & Prakash, 1989; Halpern, 1985; McDonald & Heffner, 1991).

Another reason for concern regarding youth use of these products is that cigars, bidis, and kreteks may serve as alternative pathways to nicotine addiction in some young people (Henningfield et al., 1996). Evidence exists that bidis in particular contain a more concentrated form of nicotine than cigarettes and are more addictive (Malson & Pickworth, 2002; Malson, Sims, Murty, & Pickworth, 2001).

So far, a few studies have examined correlates of adolescent cigar use (Frazier, Fisher, & Camargo, 2003), and one has examined characteristics of bidi and kretek users (Soldz, Huyser, et al., 2003a). Previous analyses of the data set to be utilized in the current study found that, among Massachusetts public school students in Grades 7 through 12, cigar use was negatively predicted by female gender, grade point average (GPA), and school attachment, whereas it was positively predicted by grade, parent's education, and truancy (Soldz, Huyser, et al., 2003a). The pattern of predictors of bidi use was similar except that parent's education did not predict use of this product, whereas residence in an urban community positively predicted use and life satisfaction negatively predicted use. For kreteks, the pattern was the same as for bidis, except that Hispanic ethnicity also had a negative relationship with use. Analyses also showed that the vast majority of users of these alternative products were lifetime cigarette smokers, but 42% of current cigar smokers were not current cigarette smokers; the comparable rates for bidis and kreteks were below 25% (Soldz, Huyser, et al., 2003a). Additional analyses of this data set have examined the brands of cigars smoked by youth (Soldz, Huyser, et al., 2003b) and the relationship between smoking cigars and the use of blunts—hollowed out cigars filled with marijuana and smoked (Soldz, Dorsey, & Huyser, 2003).

Yet, little is known about why youths are attracted to these substances. It is speculated, for example, that the increase in youth cigar use may be partly attributable to the recent marketing of cigars as an upscale product—a symbol of the good life as popularized in *Cigar Afficionado* magazine (Resnick, 1996; U.S. DHHS, 1999; Wenger, Malone, George, & Bero, 2001). As was recently suggested in one study of alternative tobacco use

(Tercyak & Audrain, 2002), an important step toward understanding would be knowledge of the attitudes and beliefs of youths about these products.

Currently available information regarding youth attitudes toward and beliefs about alternative tobacco products is extremely limited. We have identified only two relevant studies. A focus group study of 230 youths regarding cigar use among adolescents in major metropolitan areas reported on the top influences on teens to smoke cigars. Among these influences were that cigar use is relaxing, satisfies curiosity, and tastes good; that cigars are trendy and popular; and a belief that cigars are safer than cigarettes and spit tobacco (U.S. DHHS, 1999). This study also reported a lack of detailed knowledge of the health effects of cigars that could lead to a belief that cigar use is safer than that of cigarettes. A 1999 convenience sample survey of 642 urban youths in Massachusetts investigating bidi use asked a set of questions about the reasons why youths smoked bidis rather than cigarettes. Among the most endorsed reasons were that bidis taste better and are cheaper, safer, and easier to buy than cigarettes (CDC, 1999). Both studies involved small samples that were not necessarily representative of any defined population. We have identified no studies investigating attitudes or beliefs about kreteks. The current study seeks to expand knowledge of youth attitudes and beliefs regarding cigars, bidis, and kreteks by drawing on school survey data.

Among the important questions to be asked about these attitudes and beliefs is their relationship to use of alternative tobacco products and whether any attitude-use or belief-use relationship is specific to the particular products. Specifically, might certain attitudes toward alternative tobacco products be generic to users of tobacco in general? The current study examines these issues. The study explores (a) rates of endorsement of various attitude and belief items and differences in these rates by characteristics of the youths, (b) whether these attitudes are related to use of alternative tobacco products once background characteristics of the youths are controlled, and (c) the relationship of these attitudes and beliefs to cigarette use alone, as contrasted with use of alternative tobacco in combination with cigarettes.

Findings will provide a foundation for efforts to design preventive interventions to reduce the use of these products as well as a basis for future research to further elucidate these attitudes and beliefs and their relationship to actual use of products.

METHOD

Procedure

Schools were recruited by letters and phone calls to health coordinators in public middle and high schools across Massachusetts and were offered survey results in exchange for participation. Eleven schools responded. We strove to administer the survey to all students in a given school, but this proved impossible in many instances because of other demands such as standardized tests as well as other surveys. Thus, the classes and grades in which the survey was administered were the result of school-by-school negotiation; it was, however, always given in a course, usually health or physical education, which was required of all students in certain grades. The survey was administered anonymously by teachers who followed a written script provided by the research team. As far as we are aware, there were no instances of teachers failing to administer the survey in classes where they had agreed to do so. Passive parental consent was required, and two parents refused to have their children participate. Student assent was required, although no stu-

dents refused to participate. Institutional review board approval was obtained from the Massachusetts Department of Public Health Institutional Review Board.

Participants

Participants are the 5,016 7th through 12th graders from 12 schools across Massachusetts who participated in the Cigar Use Reasons Evaluation (CURE) study during the spring and fall of 2001 (Soldz, Dorsey, et al., 2003; Soldz, Huyser, et al., 2003a, 2003b). A small number (281) of 6th graders who had been included in the original CURE survey were not included in these analyses because of their evident lack of knowledge and experience with alternative tobacco products. Although the schools were not randomly selected, they are fairly equally distributed in terms of region of the state, type of community (four are urban, 47.0% of students; five suburban, 33.5% of students; three rural, 19.5% of students), and performance on the Massachusetts Comprehensive Achievement Test. The participants were 51.1% female, 81.2% White, 2.1% Black, 8.4% Hispanic, 3.7% Asian/Pacific Islander, and 4.6% other race/ethnicity. The comparable Year 2000 statewide public school race/ethnicity breakdown was 76.7% White, 8.6% Black, 10.2% Hispanic, 4.3% Asian/Pacific Islander, and 0.3% other; the CURE sample was thus less Black and Hispanic and more White than was true statewide.

The sample had a greater representation of students in the 8th and 9th grades (23.2% and 23.5%, respectively) than it did in the other grades (7th, 16.4%; 10th, 16.3%; 11th, 12.65%; 12th, 8.0%). The greater representation of 8th and 9th graders was due largely to the fact that health and/or physical education were most often required in those grades. For the six schools where we had exact classroom enrollment data, response rates of usable surveys averaged 83.5% (range = 74.9% to 97.8%).

Survey

The CURE is a 229-item survey focused on alternative tobacco use. Questions ask about student use of tobacco products, alcohol, marijuana, and blunts (hollowed-out cigars used as containers for marijuana; Action on Smoking & Health, 1999; Community Epidemiology Work Group, 2002; Tschirgi, 1994; U.S. DHHS, 1999; Yerger, Pearson, & Malone, 2001) and associated behaviors, along with demographics and potential risk factors (Soldz, Dorsey, et al., 2003; Soldz, Huyser, et al., 2003a, 2003b). Use of each of the three alternative tobacco products—cigars, bidis, and kreteks—was derived from two questions, one regarding the number of days of use in the past 30 days and another asking about the number of days of use over the lifetime. From these two variables, one ordinal variable was created with three categories: nonusers (0 days use in lifetime), lifetime use (>0 days use in life, but no use in past month), and current use (any use in past month).

For each of the three alternative tobacco products—cigars, bidis, and kreteks—there is a set of questions asking students to rate their level of agreement on 5-point scale from *strongly disagree* to *strongly agree* with seven statements about the product. Six statements are parallel across the three products: “[products] taste good,” “[products] smell good,” “[products] are not as bad for you as cigarettes,” “[products] are cheaper than cigarettes,” “[products] give you a good buzz,” and “[products] are something different to try.” For each of the three substances, one substance-specific item was also included: “successful people smoke cigars,” “bidis look like joints,” and “clove cigarettes are more natural than regular cigarettes.” The attitude and belief items were developed from a set of seven youth focus groups conducted during the development of the survey. Participants in

these groups were recruited from a variety of sources, including schools, community-based prevention centers, an outpatient facility of the state Department of Youth Services, and informal youth networks. These youth focus groups were supplemented by interviews with school health and tobacco control personnel. For the kretek items, we used the phrase *clove cigarettes*, which our focus groups had indicated was more familiar to youths, combined with instructions indicating the common identity of kreteks and clove cigarettes. This article uses the term *kreteks*, which was used by the National Youth Tobacco Survey report (CDC, 2000, 2001).

In the present study, we also used several personal characteristics of respondents as control variables. These include the demographic variables of grade, gender, race/ethnicity (White, Black, Hispanic, Asian/Pacific Islander, and other race/ethnicity), type of community (urban, suburban, rural), two-parent family, parent's education (coded as completed college vs. not completed college), school attachment (based on a single 4-point item: "How much do you like school?"), self-reported GPA, self-reported truancy (truant > 0 times in past 12 months), college plans (a dichotomous variable assessing whether a youth plans to attend college after high school), and life satisfaction (a single item: "How satisfied are you with your life as a whole these days?" assessed on a 7-point scale from 1 = *completely dissatisfied* to 7 = *completely satisfied*).

Data Analysis

One methodological issue confronted when studying students in classrooms is that students are nested in classrooms and do not constitute independent observations in that two students in the same class are likely to be more similar in attitudes and beliefs than are two students selected from the population at random. One way to deal with this nonindependence is mixed or multilevel models (Hox, 2002; Snijders & Bosker, 1999). These models are most useful when one is interested in variability in the higher level—for example, classes. In the analyses conducted in the current study, however, the nesting of students within classes is simply a nuisance factor that leads traditional techniques to have biased (smaller) standard errors. To deal with this problem, all analyses used the Huber-White robust variance estimator to adjust standard errors for the nonindependence of observations of students in the same classroom (Diggle, Liang, & Zeger, 1994; Stata Corporation, 2001). In the survey analysis literature, this approach is referred to as a linearization method of variance estimation (Levy & Lemeshow, 1999).

Contingency table techniques were used to compare endorsement rates for different use statuses (never, lifetime, current), gender, and school level (middle vs. high). Multivariate logistic regression was used to predict lifetime use of each substance. For this model, lifetime use of one of the three alternative tobacco products is the dependent variable, and the seven attitude variables were the independent variables. These analyses were controlled for a wide range of student characteristics—namely, gender, grade, race/ethnicity, type of community, parental education, two-parent family, school attachment, GPA, truancy, having a college plan, and life satisfaction.

Endorsement rates are reported as percentages and logistic regressions as odds ratios (ORs), both with associated 95% confidence intervals (CIs). All analyses were conducted with Stata SE software, version 7 (Stata Corporation, 2001).

An issue to be confronted when analyzing attitudes and beliefs about bidis and kreteks is that many—even a majority—of students were not familiar with these products. Thus, analyses were restricted to those who reported that they had heard of them (1,178 for bidis, and 1,548 for kreteks). In addition, as in most surveys, there were scattered missing

values for most variables. Case-wise deletion was used for observations with missing data. Thus, the multivariate logistic regressions were conducted only on those participants who had data for all included variables (2,045 male and 2,223 female participants for the cigar analyses, 1,055 for the bidi, and 1,329 for the kretek analyses).

RESULTS

Knowledge of Bidis and/or Kreteks

As these analyses only included youths who were aware of bidis and/or kreteks, this sample will necessarily be different from the entire sample included in the cigar attitude analyses. To explore these differences, two multivariate logistic regressions were conducted with the dependent variable being either knowing of bidis or kreteks. Independent variables in these analyses were those demographic and other personal characteristics that were to be used as control variables in analyses predicting attitudes. Knowledge of bidis was predicted by female gender (OR = 0.73, 95% CI = 0.62-0.86), grade (OR = 1.23, 95% CI = 1.15-1.31), Hispanic ethnicity (OR = 0.63, 95% CI = 0.45-0.87), attending school in a rural community (OR = 0.69, 95% CI = 0.54-0.89), GPA (OR = 0.89, 95% CI = 0.80-0.98), school attachment (OR = 0.80, 95% CI = 0.73-0.89), truancy (OR = 1.47, 95% CI = 1.25-1.73), and life satisfaction (OR = 0.94, 95% CI = 0.89-0.99). Knowledge of kreteks was predicted by similar variables—namely, grade (OR = 1.20, 95% CI = 1.14-1.27), Hispanic ethnicity (OR = 0.29, 95% CI = 0.21-0.41), attending school in either a suburban (OR = 0.75, 95% CI = 0.62-0.92) or rural community (OR = 0.69, 95% CI = 0.55-0.87), GPA (OR = 0.90, 95% CI = 0.82-0.99), school attachment (OR = 0.83, 95% CI = 0.76-0.91), truancy (OR = 1.71, 95% CI = 1.49-1.96), and life satisfaction (OR = 0.93, 95% CI = 0.89-0.98). Perhaps not surprisingly, these variables are very similar to those that predict use of these alternative tobacco products (Soldz, Huysen, et al., 2003a).

Attitude Endorsement

Total Sample. Across the entire sample, the two cigar attitudes/beliefs receiving the highest endorsement levels (Table 1) were that cigars smell good (23.1%, 95% CI = 21.4%-24.9%) and cigars are something different to try (20.2%, CI = 18.6%-21.8%), whereas the item receiving the lowest endorsement was that cigars give you a good buzz (4.6%, 95% CI = 4.0%-5.3%). The two most endorsed bidi attitudes (Table 2) were bidis look like joints (31.5%, 95% CI = 28.7%-34.4%) and bidis are something different to try (30.3%, 95% CI = 27.5%-33.2%), whereas the least endorsed items were bidis are not as bad for you as cigarettes (8.5%, 95% CI = 7.0%-10.4%) and bidis give you a good buzz (9.8%, 95% CI = 8.2%-11.6%). For kreteks, the two most endorsed items (Table 3) were kreteks smell good (27.0%, 95% CI = 24.4%-29.9%) and kreteks are something different to try (26.5%, 95% CI = 23.8%-29.4%), and the least endorsed attitudes and beliefs were kreteks are cheaper than cigarettes (5.2%, 95% CI = 4.1%-6.4%) and kreteks are not as bad for you as cigarettes (8.1%, 95% CI = 6.7%-9.7%).

Smoking Status. For all three products, endorsement of every attitude increases monotonically and significantly (all p values < .001) with the degree of smoking involvement from nonuse through lifetime (ever) use to current (past month) use. For cigar non-smokers, endorsement of cigar attitudes ranged from 1.6% (cigars taste good) to 15.3%

Table 1. Endorsement Rates for Attitudes and Beliefs About Cigars

Cigar Attitudes	Use			Gender		School Level		
	All (N = 5,016) % n (95% CI)	No Use (n = 4,101) % n (95% CI)	Lifetime Use (n = 620) % n (95% CI)	Current Use (n = 295) % n (95% CI)	Male (n = 2,451) % n (95% CI)	Female (n = 2,565) % n (95% CI)	Middle (n = 1,985) % n (95% CI)	High (n = 3,031) % n (95% CI)
Cigars taste good	11.4 (10.2-12.7)	1.6 (1.3-2.0)	44.9 (40.5-49.3)	74.0*** (68.5-78.8)	18.9 (16.7-21.3)	4.3*** (3.5-5.2)	5.5 (4.4-6.9)	15.2*** (13.6-17.0)
Cigars smell good	23.1 (21.4-24.9)	15.3 (14.0-16.7)	52.1 (48.1-56.1)	69.1*** (63.4-74.2)	30.1 (27.5-32.8)	16.4*** (14.8-18.2)	14.5 (12.8-16.5)	28.7*** (26.5-30.9)
Successful people smoke cigars	12.5 (11.6-13.4)	10.0 (9.1-11.0)	20.8 (17.8-24.1)	28.9*** (23.8-34.5)	18.2 (16.6-20.0)	7.0*** (6.0-8.1)	11.3 (10.0-12.9)	13.2 (12.1-14.4)
Cigars are not as bad for you as cigarettes	12.2 (11.2-13.2)	9.1 (8.2-10.0)	21.9 (18.6-25.7)	34.9*** (30.0-40.2)	16.1 (14.6-17.7)	8.5*** (7.3-9.8)	10.1 (8.8-11.5)	13.6*** (12.3-14.9)
Cigars are cheaper than cigarettes	8.5 (7.6-9.5)	4.5 (3.8-5.3)	20.4 (17.1-24.0)	39.0*** (33.3-45.0)	11.1 (9.7-12.6)	6.1*** (5.1-7.2)	6.3 (5.0-8.0)	10.0*** (8.8-11.2)
Cigars give you a good buzz	4.6 (4.0-5.3)	2.2 (1.8-2.7)	11.3 (9.2-13.8)	23.5*** (18.7-29.1)	6.7 (5.7-7.8)	2.7*** (2.1-3.4)	3.6 (2.8-4.6)	5.3*** (4.5-6.2)
Cigars are something different to try	20.2 (18.6-21.8)	11.9 (10.7-13.2)	52.9 (48.9-56.9)	64.3*** (58.5-69.6)	26.4 (24.0-28.8)	14.3*** (12.7-16.0)	13.4 (11.6-15.4)	24.6*** (22.6-26.7)

NOTE: CI = confidence interval.

** $p < .01$. *** $p < .001$.

Table 2. Endorsement Rates for Attitudes and Beliefs About Bidis

	Use			Gender		School Level		
	All	No Use	Lifetime Use	Current Use	Male	Female	Middle	High
	(n = 1,178) % n (95% CI)	(n = 848) % n (95% CI)	(n = 238) % n (95% CI)	(n = 84) % n (95% CI)	(n = 651) % n (95% CI)	(n = 527) % n (95% CI)	(n = 339) % n (95% CI)	(n = 839) % n (95% CI)
Bidi Attitudes	20.6 (17.9-23.5)	1.0 (0.5-1.9)	70.3 (64.1-75.9)	73.8*** (62.8-82.5)	22.7 (19.1-26.7)	17.9* (14.8-21.6)	13.3 (9.9-17.6)	23.4*** (20.1-27.1)
Bidis taste good	23.4 (20.6-26.3)	6.1 (4.6-7.9)	66.5 (60.3-72.2)	72.6*** (61.5-81.5)	26.3 (22.4-30.6)	19.7* (16.3-23.7)	16.4 (12.8-20.7)	26.1*** (22.8-29.7)
Bidis look like joints	31.5 (28.7-34.4)	20.9 (18.0-24.1)	58.1 (51.9-64.0)	61.9*** (50.6-72.0)	34.1 (30.2-38.2)	28.3* (24.6-32.3)	26.2 (21.5-31.6)	33.6* (30.3-37.0)
Bidis are not as bad for you as cigarettes	8.5 (7.0-10.4)	2.1 (1.2-3.5)	19.1 (14.4-25.0)	42.9*** (32.7-53.7)	9.7 (7.6-12.4)	7.0 (5.1-9.6)	8.9 (6.3-12.6)	8.4 (6.6-10.6)
Bidis are cheaper than cigarettes	10.2 (8.3-12.5)	2.8 (1.8-4.2)	26.0 (20.0-33.0)	39.8*** (28.5-52.2)	12.8 (10.1-16.1)	7.0** (5.1-9.6)	8.0 (5.4-11.6)	11.1 (8.8-14.0)
Bidis give you a good buzz	9.8 (8.2-11.6)	2.8 (1.9-4.1)	26.0 (20.4-32.4)	32.9*** (23.6-43.9)	12.2 (9.9-14.9)	6.8** (4.9-9.4)	7.7 (5.2-11.3)	10.6 (8.8-12.8)
Bidis are something different to try	30.3 (27.5-33.2)	13.8 (11.5-16.6)	69.9 (63.6-75.5)	81.0*** (70.1-88.5)	32.3 (28.7-36.1)	27.8 (23.9-32.0)	21.5 (17.5-26.1)	33.7*** (30.4-37.3)

NOTE: CI = confidence interval.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Endorsement Rates for Attitudes and Beliefs About Kreteks

	Use			Gender		School Level		
	All (n = 1,548) % n (95% CI)	No Use (n = 1,095) % n (95% CI)	Lifetime Use (n = 311) % n (95% CI)	Current Use (n = 126) % n (95% CI)	Male (n = 795) % n (95% CI)	Female (n = 753) % n (95% CI)	Middle (n = 494) % n (95% CI)	High (n = 1,054) % n (95% CI)
Clove Attitudes	22.9 (20.6-25.5)	2.0 (1.3-2.9)	69.6 (64.1-74.6)	86.4*** (79.1-91.4)	24.3 (21.0-27.9)	21.5 (18.4-24.9)	17.8 (14.1-22.1)	25.3** (22.4-28.5)
Kreteks taste good	27.0 (24.4-29.9)	9.1 (7.4-11.1)	67.6 (62.2-72.6)	81.6*** (73.9-87.4)	27.3 (23.9-31.0)	26.8 (23.5-30.4)	18.7 (14.8-23.2)	31.0*** (27.7-34.4)
Kreteks are more natural than cigarettes	17.0 (15.2-19.0)	7.9 (6.5-9.6)	34.2 (29.4-39.4)	54.0*** (45.1-62.7)	16.5 (13.9-19.5)	17.6 (15.0-20.5)	14.6 (11.8-17.9)	18.1 (15.9-20.7)
Kreteks are not as bad for you as cigarettes	8.1 (6.7-9.7)	3.6 (2.6-4.9)	15.1 (11.3-19.9)	28.8*** (21.2-37.8)	7.0 (5.4-9.1)	9.2 (7.2-11.7)	7.4 (5.4-10.0)	8.4 (6.7-10.6)
Kreteks are cheaper than cigarettes	5.2 (4.1-6.4)	1.5 (1.0-2.4)	12.5 (9.2-16.8)	18.7*** (12.9-26.3)	5.5 (4.1-7.3)	4.8 (3.5-6.7)	4.7 (3.0-7.2)	5.4 (4.2-7.0)
Kreteks give you a good buzz	8.7 (7.3-10.3)	2.3 (1.5-3.4)	21.4 (17.1-26.3)	33.1*** (24.6-42.8)	10.2 (8.2-12.5)	7.1* (5.5-9.2)	7.2 (5.2-9.7)	9.4 (7.6-11.6)
Kreteks are something different to try	26.5 (23.8-29.4)	10.8 (9.0-12.8)	60.6 (54.7-66.2)	79.0*** (70.5-85.6)	27.0 (23.6-30.8)	26.0 (22.8-29.5)	18.1 (14.4-22.4)	30.5*** (27.1-34.0)

NOTE: CI = confidence interval.

** $p < .01$. *** $p < .001$.

(cigars smell good), whereas for current smokers, endorsement rates ranged from 23.5% (cigars give you a good buzz) to 74.0% (cigars taste good). For bidi attitudes, nonuser endorsement rates ranged from 1.0% (bidis taste good) to 20.9% (bidis look like joints), whereas current user endorsement rates ranged from 32.9% (bidis give you a good buzz) to 81.0% (bidis are something different to try). For kreteks, nonuser attitude endorsement ranged from 1.5% (kreteks are cheaper than cigarettes) to 10.8% (kreteks are something different to try), whereas current user endorsement ranged from 18.7% (kreteks are cheaper than cigarettes) to 86.4% (kreteks taste good).

Gender. Males endorsed every cigar attitude at a higher rate than did females (all p s < .001): taste good (male = 18.9%, female = 4.3%), smell good (male = 30.1%, female = 16.4%), successful people smoke cigars (male = 18.2%, female = 7.0%), not as bad for you as cigarettes (male = 16.1%, female = 8.5%), are cheaper than cigarettes (male = 11.1%, female = 6.1%), good buzz (male = 6.7%, female = 2.7%), and something different to try (male = 26.4%, female = 14.3%).

Males had significantly higher endorsement rates for five bidi items: taste (male = 22.7%, female = 17.9%, p < .05), smell (male = 26.3%, female = 19.7%, p < .05), look like joints (male = 34.1%, female = 28.3%, p < .05), are cheaper than cigarettes (male = 12.8%, female = 7.0%, p < .01), and good buzz (male = 12.2%, female = 6.8%, p < .01). There was a significant difference for only one kretek item: good buzz (male = 10.2%, female = 7.1%, p < .05). The male-female differences for these items all remained significant when the analysis was repeated among current users of cigars and kreteks only.

Middle Versus High School. High school students had higher endorsement rates than did middle school students for all cigar attitudes and beliefs except for the item successful people smoke cigars (middle school = 11.3%, high school = 13.2%, p > .05): taste good (middle school = 5.5%, high school = 15.2%, p < .001), smell good (middle school = 14.5%, high school = 28.7%, p < .001), not as bad as cigarettes (middle school = 10.1%, high school = 13.6%, p < .001), cheaper than cigarettes (middle school = 6.3%, high school = 10.0%, p < .001), good buzz (middle school = 3.6%, high school = 5.3%, p < .01), and something different to try (middle school = 13.4%, high school = 24.6%, p < .001).

There were school-level differences in endorsement rates for four bidi items: taste good (middle school = 13.3%, high school = 23.4%, p < .001), smell good (middle school = 16.4%, high school = 26.1%, p < .001), look like joints (middle school = 26.2%, high school = 33.6%, p < .05), and something different to try (middle school = 21.5%, high school = 33.7%, p < .001). Three kretek items exhibited significant school-level differences: taste good (middle school = 17.8%, high school = 25.3%, p < .01), smell good (middle school = 18.7%, high school = 31.0%, p < .001), and something different to try (middle school = 18.1%, high school = 30.5%, p < .001).

Relationship of Personal Characteristics to Attitudes

To explore further the relationship of demographic and role functioning variables to alternative tobacco products attitudes, we conducted a set of multiple regressions, one for each alternative tobacco product, in which these variables were used to predict an attitude composite for that product. We used a composite score as the outcome to avoid the several hundred regression parameters that would result were these regressions to be conducted on each attitude separately. In other words, the composite score was the number of atti-

tude items answered in the affirmative. The alphas for the composites were .69 for cigars, .81 for bidis, and .81 for kreteks.

The cigar attitude composite was predicted by female gender ($B = -.66, p < .001$), grade ($B = .12, p < .001$), Hispanic ethnicity ($B = -.24, p = .004$), parents' education ($B = .11, p = .01$), GPA ($B = -.23, p < .001$), school attachment ($B = -.10, p = .001$), and truancy ($B = .32, p < .001$). The bidi attitude composite was predicted by female gender ($B = -.31, p = .004$), grade ($B = .11, p = .007$), living in a two-parent family ($B = -.32, p = .04$), and GPA ($B = -.38, p < .001$). The kretek attitude composite was predicted by grade ($B = .17, p = .001$), GPA ($B = -.34, p = .001$), and truancy ($B = .38, p = .008$).

Attitude-Use Relationship: Multivariate Analyses

We examined whether the relationship between attitudes and use of these products was primarily due to other characteristics of users. We thus conducted three logistic regressions—predicting lifetime use of cigars, bidis, or kreteks—with the attitudes as predictors and controlling for a wide range of student characteristics. Because of the gender differences in endorsement rates for several attitude/belief variables, we first examined models in which the interaction of each attitude with gender was included. For neither bidis nor kreteks were any of the interactions significant, so the models for the total sample are presented. For cigars, however, two attitudes variables, smell good and not as bad for you as cigarettes, exhibited significant interactions with gender, so we present separate models for males and females in this case. Although the attitude that cigars are not as bad for you as cigarettes had a significant interaction with gender, in neither males nor females was it significant, although among males it was associated with increased cigar smoking and among females with reduced use.

Among males, three attitudes predict cigar use (Table 4): taste good (OR = 25.73, 95% CI = 17.16-38.57), cheaper than cigarettes (OR = 2.99, 95% CI = 1.82-4.91), and something different to try (OR = 3.19, 95% CI = 2.31-4.40). Among females, however, five attitudes predicted cigar use: taste good (OR = 40.38, 95% CI = 17.96-90.77), smell good (OR = 3.06, 95% CI = 2.12-4.41), successful people smoke cigars (OR = 0.44, 95% CI = 0.20-0.99), cheaper than cigarettes (OR = 2.16, 95% CI = 1.6-4.03), and something different to try (OR = 3.07, 95% CI = 2.08-4.52).

Five attitudes predicted lifetime bidi use: taste good (OR = 66.36, 95% CI = 25.99-169.44), smell good (OR = 3.60, 95% CI = 1.67-7.74), cheaper than cigarettes (OR = 2.95, 95% CI = 1.11-7.82), good buzz (OR = 3.76, 95% CI = 1.19-11.84), and something different to try (OR = 4.08, 95% CI = 2.19-7.59). For kreteks, three attitudes significantly predicted use: taste good (OR = 51.64, 95% CI = 25.85-103.16), smell good (OR = 2.29, 95% CI = 1.22-4.30), and something different to try (OR = 2.63, 95% CI = 1.47-4.71).

Relation to Cigarette Smoking

A final set of analyses examined whether these attitudes and beliefs were generally associated with tobacco use rather than with use of the particular product the attitude or belief was about. These analyses repeated the multivariate logistic regressions predicting lifetime alternative tobacco use for the subsample of lifetime cigarette smokers only. The results of these analyses paralleled those for the whole sample, with three relationships that were significant in the whole sample becoming not significant though still in the same direction: successful people smoke cigars (for females), bidis give you a good buzz, and kreteks smell good.

Table 4. Multivariate Logistic Regression Predicting Lifetime Use of Alternative Tobacco Products

	Cigars		Bidis	Kreteks
	Male	Female		
	(n = 2,045)	(n = 2,223)	(n = 1,055)	(n = 1,329)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Cigars taste good	25.73* (17.16-38.57)	40.38* (17.96-90.77)	Bidis taste good	Kreteks taste good
Cigars smell good	1.29 (0.90-1.84)	3.06* (2.12-4.41)	Bidis smell good	Kreteks smell good
Successful people smoke cigars	0.91 (0.62-1.32)	0.44* (0.20-0.99)	Bidis look like joints	Kreteks are more natural than cigarettes
Cigars are not as bad for you as cigarettes	1.49 (0.39-1.26)	0.70 (0.39-1.26)	Bidis are not as bad for you as cigarettes	Kreteks are not as bad for you as cigarettes
Cigars are cheaper than cigarettes	2.99* (1.82-4.91)	2.16* (1.16-4.03)	Bidis are cheaper than cigarettes	Kreteks are cheaper than cigarettes
Cigars give you a good buzz	1.0 (0.54-1.85)	1.21 (0.50-2.92)	Bidis give you a good buzz	Kreteks give you a good buzz
Cigars are something different to try	3.19* (2.31-4.40)	3.07* (2.08-4.52)	Bidis are something different to try	Kreteks are something different to try
			66.36* (25.99-169.44)	51.64* (25.85-103.16)
			3.60* (1.67-7.74)	2.30 (1.22-4.30)
			0.98 (0.54-1.76)	0.95 (0.45-2.02)
			3.21 (0.74-13.97)	1.64 (0.50-5.35)
			2.95* (1.11-7.82)	1.85 (0.49-6.89)
			3.76* (1.19-11.84)	2.45 (0.83-7.20)
			4.08* (2.19-7.59)	2.63* (1.47-4.71)

NOTE: All regressions controlled for grade, race/ethnicity, type of community, two-parent family, parent's education, school attachment, grade point average, truancy, college plans, and life satisfaction. Bidi: and kretek analyses controlled for gender. CI = confidence interval; OR = odds ratio.
* $p < .05$.

Among male lifetime cigarette smokers, three attitudes predict cigar use (Table 4): taste good (OR = 21.93, 95% CI = 12.14-39.59), cheaper than cigarettes (OR = 2.70, 95% CI = 1.40-5.22), and something different to try (OR = 2.65, 95% CI = 1.82-3.86). Among females, however, four attitudes predict cigar use: taste good (OR = 24.98, 95% CI = 10.98-56.84), smell good (OR = 2.58, 95% CI = 1.71-3.90), cheaper than cigarettes (OR = 2.09, 95% CI = 1.09-4.02), and something different to try (OR = 2.05, 95% CI = 1.32-3.17).

Four attitudes predicted lifetime bidi use among lifetime cigarette smokers: taste good (OR = 55.21, 95% CI = 18.32-166.35), smell good (OR = 2.5, 95% CI = 1.04-5.99), cheaper than cigarettes (OR = 5.08, 95% CI = 1.86-13.86), and something different to try (OR = 3.71, 95% CI = 1.82-7.55). For kreteks, two attitudes significantly predicted use: taste good (OR = 98.77, 95% CI = 35.19-277.23) and something different to try (OR = 3.15, 95% CI = 1.63-6.06).

DISCUSSION

The increases in endorsement rates for all attitude and belief items as the degree of involvement in use of these substances increased (from nonuse through lifetime use to current use) make clear that use of these products is strongly associated with attitudes and beliefs about them. Across the three types of tobacco products, the items regarding smelling, tasting good, and being different to try were among the most endorsed items among users. The high endorsement rates for the item something different to try suggest that experimentation is a strong attraction of these products. Similarly, both smell and taste are attractive to users, especially current users. The taste items were very strongly associated with actual use of the products, with odds ratios ranging from 27.9 for cigars to 66.4 for bidis. Thus, at most, 2.0% of nonusers agreed that these products taste good, whereas between 73.8% and 86.4% of current users endorsed the taste item. In the multivariate analysis, the items regarding smelling good and being something different to try were strong predictors of use of all three products. The tastes-good items were predictive of use of all products except for cigar smoking among boys. Thus, it is essential for researchers to better understand what makes the taste and smell of these products attractive. The causality may, of course, be in the opposite direction: Those who smoke these products have greater familiarity with their taste and smell, which may then lead to more reported liking of these features. Clarification of the direction of the relationship is an important issue for future research.

There were systematic gender differences, with males being more likely to endorse all cigar items, five of the seven bidi items, and one kretek item. No items were more likely to be endorsed by females. These gender differences for cigars and the one kretek item remained when gender differences among only current users were examined, whereas there were no significant gender differences among bidi current users. Thus, cigars, in particular, are viewed more positively by males, whether users or not. These results suggest that some prevention strategies are needed aimed at countering attitudes and beliefs of boys, whereas other strategies may be required to address girls' use, and further research needs to examine gender differences in factors influencing use of cigars.

Endorsement rates for many attitudes and beliefs were also higher for high school than middle school students, which suggests that early prevention efforts aimed at middle, or even elementary, students that attempt to counter these attitudes and beliefs before they become entrenched may be more effective than later efforts aimed at high school stu-

dents. On the other hand, there may be developmental factors active during the high school years that affect youths' readiness to initiate at that age. If this is the case, prevention efforts aimed at earlier ages may prove ineffective, and efforts aimed at high-school-aged youth may be more successful. Thus, any preventive efforts should be routinely monitored for effectiveness so that ineffective strategies can be modified.

The attitudes and beliefs about the individual substances are illuminating. It had been speculated that the increase in youth cigar use was partly because of the aura of wealth and success that is associated with cigars in recent media, such as *Cigar Aficionado* magazine (Shanken, 1996; U.S. DHHS, 1999). Although 12.5% of the sample and 28.9% of current users endorsed the item successful people smoke cigars, this was the second least endorsed item among current smokers. In the multivariate analyses controlling for background characteristics and other attitudes and beliefs, the item was associated with use only among girls but in the *negative* direction: Girls who endorsed it had lower rates of cigar smoking. Similarly, in the focus groups we conducted while developing the CURE survey, only a very few youths were familiar with *Cigar Aficionado*, and the association of cigars with rich, older men was more a turn off rather than an attraction. Thus, at least as reported by the youths themselves, this cultural factor, although present, does not seem to play a major role in the surge in youth cigar use. At the cultural level, the increase in cigar use and images in music videos and media appealing to youths may be a more important factor (U.S. DHHS, 1999).

For both cigars and bidis, a sizeable percentage of current users (39.0% and 39.8%, respectively) reported that these products were cheaper than cigarettes, and this item was related to use of these products in the multivariate model. These findings support concerns that the lower price of inexpensive cigars and bidis, at least partly because of lower taxes, makes these products attractive to youths.

One striking finding regarding bidis is the perceived similarity between bidis and marijuana cigarettes, or joints. That bidis look like joints was the most endorsed bidi item in the total sample. Although this item was not related to bidi use in the multivariate model, the item bidis give you a good buzz was. Given that the parallel items for cigars and kreteks were not significant in the multivariate models predicting use of those substances, these results suggest that the buzz attributed to bidis may be at least partly a matter of perceived similarity to joints thus contributing to an attribution of mind-altering powers to the bidis.

In the youth focus groups and interviews conducted while developing the CURE survey, participants raised the issue of the common perception among youths that kreteks are more natural than cigarettes. Indeed, 17.0% of the total sample and three times that percentage of current users endorsed this belief. Although this item was not a significant predictor of use in the multivariate model, its high rate of endorsement among current users suggests that this belief could make kreteks more acceptable to youths. Thus, prevention efforts may require a better understanding of what adolescents mean by *natural* and how young people come to this belief about kreteks.

Limitations of the Study

In interpreting these findings, it is important to keep in mind that the causal directions of the attitude/belief relationships with use revealed in this study are not clear. It is possible that positive attitudes and beliefs about these products predispose some youths to trying them. However, attitudes and beliefs may well change as a result of use of the products through both familiarity and the reduction of cognitive dissonance (Draycott & Dabbs,

1998; Festinger, 1957). In terms of familiarity, users of cigars, for example, may become more accustomed to their taste thereby leading to more positive responses to the item cigars taste good. Cognitive dissonance reduction may occur because use of a tobacco product and a belief that it smells and tastes bad, for example, are dissonant attitudes; the dissonance can be reduced by changing the attitudes and beliefs to be more positive toward the product. Even if attitude/belief endorsement is partly due to cognitive dissonance reduction, these attitudes and beliefs, once acquired, may contribute to future use of these products.

Both use of these products and positive attitudes and beliefs toward them may be a result of other factors such as socioeconomic status or a propensity toward rebellious behavior. Thus, the predictors of attitude endorsement in the present study resemble the predictors of use reported in our prior work (Soldz, Huyser, et al., 2003a). The multivariate analysis attempted to control for this by controlling for a wide range of respondent characteristics that are each independently associated with alternative tobacco use (Soldz, Huyser, et al., 2003a). Several of the attitudes including the taste, smell, and something-different-to-try items for each product were still significant predictors of use thus suggesting that there may indeed be a direct causal relationship, although, as noted above, the direction of this relationship cannot be definitively clarified given the cross-sectional nature of the current study. Furthermore, the fact that the relationship between these attitudes and alternative tobacco use remains substantially unchanged when the analysis is repeated among those youth who are lifetime cigarette smokers suggests that the association between these attitudes and use is specific to the alternative tobacco products.

This study has some other limitations that must be kept in mind when interpreting the findings. We have already discussed our inability to unambiguously determine the causal direction between product use and attitude endorsement. In addition, this study examined a convenience sample in one state, Massachusetts, in the northeast United States. Thus, results may not generalize to the population of students in this state or to students in other parts of the country. Furthermore, like most survey studies, this one was based solely on self-report and may be influenced by various biases arising from that factor.

Implications for Practitioners

Despite the limitations, the current study provides important clues for those trying to prevent youth use of tobacco in general and these products in particular. It is certain, given the present results, that a plausible prevention strategy would be to develop interventions countering these attitudes and beliefs. Our discussions with school health personnel indicated a lack of familiarity with these products and an absence of any discussion of them in the health curriculum. Given their attraction to youths, this should change. Those working with youths should develop greater familiarity with these products and their attractions.

Helping youths understand the health risks of alternative tobacco products would be a first step. But beyond this, prevention strategies should seek ways to counter the attractions of the perceived taste and smell of these products and their attraction as vehicles for adolescent experimentation. Some of the tobacco control campaigns aimed at delegitimizing cigarette manufacturers may be good models (Bauer, Johnson, Hopkins, & Brooks, 2000; Hicks, 2001; Sly, Heald, & Ray, 2001). Changing the image of the products may be essential to preventing further use of them. Another possibility may be the

development of similarly tasting and smelling nontobacco alternatives that would be less harmful but equally attractive to youths.

To guide prevention efforts, the present study needs to be supplemented by additional research elucidating the attractions to youths of cigars, bidis, and kreteks. Otherwise, prevention efforts may be designed in the dark.

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