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First Tobacco Product Tried: Associations with Smoking Status and Demographics among College Students

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Abstract

Introduction—As the tobacco market expands, so too have the opportunities for youth to be introduced to nicotine. The goal of this study was to identify product choice for initial tobacco trial, correlates associated with product choice, and the relationship between first product and current cigarette smoking among college students.

Methods—A cross-sectional web survey of 3,146 first-year students at 11 universities in North Carolina and Virginia was conducted in fall 2010.

Results—Weighted prevalence of ever use of tobacco was 48.6%. Cigarettes were the most common first product (37.9%), followed by cigars (29.3%), hookahs (24.6%), smokeless tobacco (6.1%), and bidis/kreteks (2.2%). Two thirds (65%) of current smokers initiated with cigarettes,

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Contributors

ELS led the conceptualization of this study, contributed to measures development and data collection and analysis, and wrote the first draft and subsequent revisions. CKS and BAR conducted all analyses and developed all tables. AS and JRP assisted in data collection and the literature review. KGW, JS and MW contributed to the conceptualization and measures development and reviewed multiple drafts of the paper. All authors approved the final paper.

Conflict of Interest

All authors declare that they have no conflicts of interest.

but 16.4% started with cigars, 11.1% with hookahs, 5.7% with smokeless, and 1.7% with bidis/kreteks. Females were more likely to report their first product was cigarettes and hookahs, while males were more likely to start with cigars and smokeless tobacco. Compared to those whose first product trial occurred after the age of 18, younger age of initiation (17 years or younger) was associated with cigarettes and smokeless as first products, while older age of initiation (18 or older) was associated with starting with hookahs and cigars. Dual or poly tobacco use was more common among those who initiated with hookahs and smokeless tobacco.

Conclusions—While over a third of students used cigarettes first, two thirds started with a non-cigarette product. Just about a third of current cigarette smokers initiated with a non-cigarette product, suggesting that those non-cigarette products may have facilitated escalation to cigarettes.

Keywords

Non-cigarette tobacco products; college students; cigarette smoking

1. INTRODUCTION

With the proliferation of new tobacco products, youth have the opportunity to be introduced to nicotine in many ways. Historically the choices were limited to cigarettes, cigars, chewing tobacco and snuff/dip, but today these have been joined by hookah, electronic cigarettes, bidis, kreteks, snus and dissolvable tobacco (U.S. Department of Health and Human Services, 2012). Given the changing landscape of tobacco, product choice for initiation may be shifting.

While the Family Smoking Prevention and Tobacco Control Act (FSPTCA) gave the Food and Drug Administration (FDA) broad authority to regulate cigarettes, roll your own tobacco and smokeless tobacco to protect public health, that authority does not yet apply to other tobacco products (*H.R. 1256 (111th)*, 2009). Recently, the FDA proposed to extend its authority to cover all tobacco products meeting the statutory definition (Food and Drug Administration, 2014). However, FDA's ban on "characterizing flavors" in *cigarettes* (i.e., distinguishable taste or aroma other than tobacco or menthol) was not proposed to extend to other tobacco products. Consequently, other tobacco products are available in a variety of flavors. There is considerable evidence that youth are attracted to flavored tobacco products (Klein, 2008). Villanti and colleagues conducted a study of a nationally representative sample of young adults and found that 18-24 year olds had 89% higher odds of using flavored tobacco products than 25-34 year olds (Villanti, Richardson, Vallone, & Rath, 2013). Black young adults, compared to Whites, had over two and a half times greater odds of using flavored tobacco. Even after controlling for menthol use, Black young adults were significantly more likely to use flavored tobacco products than Whites. Additionally, there is evidence that flavored tobacco products are associated with beliefs of less harm and lower addictive potential (Centers for Disease Control and Prevention, 1999; Primack et al., 2008). Therefore, the availability of these products in appealing flavors may be attractive to youth as a first product. However, little is known about product choice for initiation since the landscape of available products has changed.

A recent study of a nationally representative panel of young adults aged 18-25 found that 73% of tobacco users reported cigarettes were their first product, followed by 11% who initiated with cigars, 5% with little cigars/cigarillos/bidis, 4% with hookah, 3% with dip and 1% with chew (Rath, Villanti, Abrams, & Vallone, 2012). Although Rath and colleagues described product choice for initiation, they did not explore correlates, such as demographic and behavioral factors, associated with first product used. Nor did they assess how first product choice is related to current cigarette smoking.

While little is known about correlates associated with first tobacco product choice, research has consistently shown important demographic factors associated with tobacco use. For example, males are more likely to use several forms of tobacco, including cigars, bidis, kreteks (U.S. Department of Health and Human Services, 2012), hookahs (Barnett, Curbow, Weitz, Johnson, & Smith-Simone, 2009; Sutfin et al., 2011), snus (Johnston, O'Malley, Bachman, & Schulenberg, 2013) and dissolvables (McMillen, Maduka, & Winickoff, 2012) than females. While education is negatively associated with cigarette smoking (Green et al., 2007), McMillen and colleagues found that higher education was associated with having tried hookah, snus, or electronic cigarettes (McMillen et al., 2012). Associations of tobacco use and race are also well documented. White adolescents and young adults consistently smoke cigarettes, hookah, and use smokeless tobacco at higher rates than those of other races; however, differences by race are less pronounced for cigar smoking (Dugas, Tremblay, Low, Cournoyer, & O'Loughlin, 2010; Sutfin et al., 2011; U.S. Department of Health and Human Services, 2012).

Attracting nonsmokers with appealing flavors and impressions of reduced harm, these novel products may serve as an introduction to nicotine, setting up the potential for addiction (DiFranza & Wellman, 2005). Once tobacco use has been initiated, the risk of continued use and escalation to cigarettes is a primary concern (McMillen et al., 2012) and a critical research question. The relationship between first product and future tobacco use is not well understood. However, using a stratified random sample of 4,486 high school students from Cuyahoga County in Cleveland, Brooks and colleagues studied the relationship between cigarette and cigar use, including which product was initiated first (Brooks, Gaier Larkin, Kishore, & Frank, 2008). They found that among adolescents who initiated with cigarettes, 17% were current cigarette smokers only, 16% currently smoked both cigarettes and cigars and 4% smoked only cigars. Conversely, among those who initiated with cigars, 15% reported currently smoking only cigarettes, 12% only cigars and 44% smoked both cigarettes and cigars. These findings suggest that initiating with cigars is associated with a higher prevalence of dual use than initiating with cigarettes. Meier et al. (2015) conducted a recent study assessing first product tried and subsequent tobacco use among a sample of college students from a single university. They found that initiating tobacco use with either cigarettes or smokeless tobacco (chew or dip) compared to those who initiated with hookah or emerging tobacco products (dissolvables, snus or e-cigarettes) was associated with increased likelihood of current poly tobacco use (Meier, Tackett, Miller, Grant, & Wagener, 2015).

Understanding product initiation and factors related to which product is used first will begin to clarify the hypothesis that certain tobacco products may facilitate escalation to future

cigarette smoking (McMillen et al., 2012). The goals of this study were to: (1) identify the first tobacco product tried among a large sample of young adults, (2) assess the relationship between first product tried and subsequent cigarette smoking and (3) identify demographic correlates associated with first product tried to identify potential targets for intervention.

2. METHODS

2.1 Sample

Data are from the baseline survey of a larger study entitled *Smokeless Tobacco Use in College Students*. The goal of the parent study was to assess trajectories and correlates of smokeless tobacco use in a cohort of college students over the course of their college careers. This study included 11 colleges and universities in North Carolina and Virginia with seven of the participating schools in North Carolina and four in Virginia (Wolfson et al., 2013). Nine were public schools and two were private. Undergraduate enrollments ranged from about 4,000 to 23,000.

In the fall of 2010, 10,624 incoming first-year students at the 11 schools completed a brief screener survey used to determine eligibility for the longitudinal cohort study. Students were emailed an invitation to participate in a brief web-based screener survey. The response rate for the screener survey was 36% (Spangler et al., 2014). Students who ever used smokeless tobacco products, current cigarette smokers and males were oversampled for inclusion in the cohort. All other students, including non-smokers and those who never used smokeless tobacco, were randomly sampled for cohort inclusion.

Two weeks after the screener survey, a sample of those screened eligible was invited to participate in the longitudinal cohort survey. Potential participants were contacted via email which included a link to a secure website for survey completion. The survey took about 20 minutes to complete. Non-respondents received up to four email reminders, a phone call and a text reminder. Participants received a \$15 incentive. Of the 4,902 invited to participate, 3,146 completed the baseline fall 2010 cohort survey for a response rate of 64.2%.

The study protocol was approved by the Wake Forest School of Medicine Institutional Review Board (IRB). Three participating campuses required local IRB approval, while the remaining schools accepted the Wake Forest approval. Additional privacy protection was secured by a Certificate of Confidentiality issued by the Department of Health and Human Services.

2.2 Measures

Demographic Characteristics. Demographic characteristics included gender, race (coded as Non-White vs. White), ethnicity (Hispanic vs. Non-Hispanic) and maternal educational level (some college education or less vs. college degree or higher).

Lifetime Tobacco Use. Students were considered lifetime tobacco users if they answered affirmative to: Have you ever smoked/used [product], even one or two puffs/times? Products assessed included: cigarettes, cigars, chewing tobacco, moist or dry snuff (dip), snus,

dissolvables, bidis, kreteks (cloves), e-cigarettes, or waterpipes (hookahs). Descriptions of products were included.

Tobacco Product Age of Initiation. For each tobacco product that students reported using, they were asked how old they were at the time of first use. Response categories included the following: 8 years old or younger, each individual age between 9 and 21, and 22 years old or older. *Tobacco product age of initiation* was determined using the response for age of first use for the product identified as first used by the student (as described in the construct *First Tobacco Product* below). These ages were collapsed into three categories: 13 or younger, 14-17, and 18 or older. These categories were chosen because early onset of smoking (often defined as 13 years or younger) is associated with several negative outcomes including increased risk of academic problems, use of other substances (Ellickson, Tucker, & Klein, 2001), heavier smoking and less successful quitting (Breslau & Peterson, 1996).

First Tobacco Product. Participants were asked, “What was the first tobacco product that you ever used, even just one time?” Response options included the following: never used, cigarette, cigar, chewing tobacco, moist or dry snuff (dip), snus, dissolvables, bidi, kretek (clove), e-cigarette, or waterpipe (hookah). Due to low prevalence, chewing tobacco, moist or dry snuff (dip), snus, and dissolvables were collapsed into a smokeless tobacco category for the multivariate analyses. Bidi and kretek (clove) were also combined into one category for the same reason.

Current Cigarette Smokers. Current smokers were defined as those who reported cigarette smoking in the past 30 days.

Dual or Poly Tobacco Use. Students were classified as dual or poly tobacco users if they reported past 30 day use of tobacco products in at least two of the following categories: cigarettes, cigars, hookah, smokeless tobacco and bidis/kreteks.

Parental Cigarette Smoking. We created a variable to assess parental cigarette smoking. Participants who reported that either their mother (or female guardian) or father (or male guardian) or both were current cigarette smokers were coded as “yes” on this variable.

Statistical Analyses. Because of the oversampling of lifetime smokeless users, current smokers, and males, sampling weights were used in computing prevalence estimates and in regression analyses. Sampling weights were calculated independently for each school within each cell of the sampling frame according to gender and history of tobacco use, by dividing the number of individuals in each cell of the sampling frame by the corresponding number of individuals in the cohort. Weights were then scaled using the approach used by Pfefferman and colleagues (Pfeffermann, Skinner, Holmes, Goldstein, & Rasbash, 1998) in order to account for our complex survey design (i.e., students were sampled within schools). Thus, prevalence and regression estimates represent the entire screened population of first-year students. Weighted prevalences of first product initiated were generated for various demographic and behavioral characteristics using PROC SURVEYSELECT in SAS version 9.2 (SAS Institute Inc., Cary, NC). Multivariable analyses were conducted using random effects logistic regression models adjusting for sampling weights and clustering within

schools, using the GLLAMM procedure in Stata version 10.1 (StataCorp, College Station, TX).

3. RESULTS

Weighted prevalence of ever using any tobacco product was 48.6% (N=1,946). However, complete data on all covariates were available for 1,656 of those; therefore, the analytic dataset is comprised of 1,656. Over half of the sample of lifetime tobacco users were female (56%), the majority were White (89%), non-Hispanic (93%), and had mothers with at least a college degree (63%). First tobacco use was most commonly between ages 14-17 (61%) (see Table 1). Table 1 also shows demographics by first product. Two-thirds of those who initiated with cigarettes, hookahs, and bidis/kreteks were females. Only 42% of those who initiated with cigars and 12% of those who initiated with smokeless were females. Interestingly, 19% of those who initiated with bidis/kreteks were of Hispanic ethnicity and most (85%) had mothers with a college degree or higher.

Among ever tobacco users, cigarettes were the most common first tobacco product (37.9%), followed by cigars (29.3%), hookahs (24.6%), smokeless (6.1%), and bidis/kreteks (2.2%) (see Table 2). No students reported their first tobacco product was electronic cigarettes. Table 2 shows product initiation by gender and current cigarette smoking. Among females, cigarettes were most commonly initiated first (44.8%), followed by hookah (29.2%) and cigars (21.9%). Few females initiated smokeless or other tobacco products. Among males, cigars were most commonly initiated first (38.5%), followed by cigarettes (29.2%), hookah (18.7%) and smokeless tobacco (12.0%).

Table 2 also shows product choice for initiation among current cigarette smokers. The majority of current cigarette smokers (65.0%) reported cigarettes were their first product, followed by cigars (16.4%), hookah (11.1%), smokeless tobacco (5.7%) and bidis/kreteks (1.7%).

In multivariable analyses, demographic correlates associated with first product used differed by product (see Table 3). Those who initiated with **cigarettes** (compared to those who initiated with other tobacco products) were more likely to be female (AOR=2.06, CI: 1.52, 2.80), to have mothers with less than a college degree (AOR=0.66, CI: 0.46, 0.94), to be current cigarette smokers (AOR=7.28, CI: 5.31, 9.97), to have reported younger age of tobacco initiation (AOR=5.62, CI: 3.59, 8.81 for 13 or younger vs. 18+ and AOR=2.91, CI: 2.18, 3.87 for 14-17 vs. 18+), and to have at least one parent who is a current cigarette smoker (AOR=1.92, CI: 1.36, 2.70); however, they were less likely to have reported current dual or poly tobacco use (AOR=0.55, CI: 0.39, 0.76).

Those who initiated with **cigars** were less likely to be female (AOR=0.43, CI: 0.28, 0.66), current cigarette smokers (AOR=0.33, CI: 0.24, 0.47), and to have reported age of tobacco initiation of 14-17 (vs. 18+; AOR=0.61, CI: 0.44, 0.84).

Those who initiated with **hookah** were more likely to be female (AOR=2.21, CI: 1.54, 3.19), current dual or poly tobacco users (AOR=1.51, CI: 1.04, 2.20), and have mothers with a college degree or higher (AOR=1.35, CI: 1.07, 1.71); however, they were less likely to be

current cigarette smokers (AOR=0.30, CI: 0.20, 0.44), have parents who are current cigarette smokers (AOR=0.61, CI: 0.44, 0.84), and less likely to have reported younger age of tobacco initiation (AOR=0.08, CI: 0.03, 0.16 for 13 or younger vs. 18+ and AOR=0.46, CI: 0.32, 0.66 for 14 to 17 vs. 18+).

Finally, those who reported initiating with **smokeless tobacco** were less likely to be female (AOR=0.09, CI: 0.06, 0.16), Non-White (AOR=0.11, CI: 0.03, 0.46), current cigarette smokers (AOR=0.46, CI: 0.32, 0.68), and were more likely to be current dual or poly tobacco users (AOR=1.65, CI: 1.06, 2.56) and to have reported younger age of initiation (AOR=5.90, CI: 3.32, 10.50 for 13 or younger vs. 18+ and AOR=3.47, CI: 2.40, 5.03 for 14-17 vs. 18+).

Because only 28 participants initiated with bidis/kreteks, multivariable analysis assessing correlates of first product tried were not conducted.

4. DISCUSSION

Among ever tobacco users, just over a third reported cigarettes were their first product (38%), while just under a third reported trying cigars first (29%), followed by a quarter (25%) who reported trying hookah first, 6% used a smokeless product first and finally bidis & kreteks were used first by 2%. In this study, no students reported that e-cigarettes were the first product they tried; however, this is likely a cohort effect that appears to be changing. In our study, most participants reported having tried their tobacco first product between the ages of 14-17, at a time when e-cigarettes were not yet widely available. However, more recent studies of younger adolescents suggest that for some, e-cigarettes are indeed their first tobacco product. In a study of middle and high school students in Connecticut, Krishnan-Sarin and colleagues found that among those middle school students who had ever tried an e-cigarette, 51.2% reported that e-cigarettes were the first tobacco product they had tried (Krishnan-Sarin, Morean, Camenga, Cavallo, & Kong, 2014). More research is needed to assess how the introduction of e-cigarettes into the marketplace may be altering choice of first tobacco product for adolescents.

Our findings differ from those of Rath and colleagues, who found 73% of ever tobacco users reported cigarettes were their first product, followed by 11% who initiated with cigars, 5% with little cigars/cigarillos/bidis and 4% with hookah (Rath et al., 2012). Rath and colleagues used a nationally representative sample of young adults aged 18-34, which included, but did not consist entirely of college students. The differential pattern observed in this study may be due to our focus on college students and the younger age of participants in our study. Additionally, regional differences may have contributed to the differential findings. However, more research is needed to understand how college students and their non-college peers may differ in the first tobacco product tried.

While the majority of *current cigarette smokers* (65%) reported cigarettes were the tobacco product that they tried first, 16% reported cigars were their first product, 11% initiated with hookah, and almost 6% initiated with a type of smokeless tobacco. Although these data are cross-sectional, they suggest that for some, non-cigarette products, including cigars, hookah

and smokeless tobacco may serve as a starter product, providing an introduction to nicotine and possibly promoting escalation to cigarette use. Tomar found that among young male smokeless tobacco users who were not cigarette smokers at baseline, 40% had either switched to cigarettes or become dual users four years later (Tomar, 2003).

Initiation with non-cigarette products may be appealing due to their availability in a wide-range of flavors. Palatability of tobacco products is an important factor in appeal and use (Henningfield, Hatsukami, Zeller, & Peters, 2011) and flavorings enhance palatability (Oliver, Jensen, Vogel, Anderson, & Hatsukami, 2013). It is well documented that adolescents and young adults use flavored tobacco products at a higher rate than adults (S. M. Klein et al., 2008). Because of the appeal of flavored cigarettes among youth for smoking initiation and the potential for abuse liability (Henningfield et al., 2011), the Family Smoking Prevention and Tobacco Control Act banned the sale of cigarettes with a characterizing flavor, other than menthol, in 2009. However, non-cigarette tobacco products are still available in a wide variety of flavors (Villanti et al., 2013). For example, a recent study of electronic nicotine delivery systems advertised on the internet found that as of early 2014 there were 7764 unique flavors (Zhu et al., 2014). Similarly, Nielson Scanner data show that 47.9% of cigar products sold in convenience stores in 2013 were flavored or sweet, 30.4% were pipe flavored, 15.2% were natural leaf flavored and only 6.4% were unflavored (Convenience Store News, 2014). The availability of non-cigarette tobacco products in a wide range of flavors may make them particularly appealing for tobacco product initiation because flavors can mask the harshness of the tobacco. Almost two-thirds of participants in this study reported a non-cigarette product was their first tobacco product tried. Although we did not assess whether the first product tried was flavored, given the availability of non-cigarette products in a variety of flavors, it is plausible that for many participants, their first product was indeed flavored. More research should assess whether adolescents first tobacco product tried was a flavored product.

Additionally, perceptions of reduced harm, compared to cigarettes, may enhance the appeal of non-cigarette tobacco products. Many non-cigarette tobacco products use reduce risk claims in their marketing. For example, Primack and colleagues found that 16% of hookah establishment websites included direct claims that hookah smoking was safer than cigarette smoking (Primack et al., 2012). These products are generally perceived as less harmful than cigarettes, particularly among those who use the product (Smith, Curbow, & Stillman, 2007). Marketing that suggests they are less harmful than cigarettes may influence experimentation.

Our data suggest that non-cigarette products have some appeal for initiation and some cigarette smokers initiated with non-cigarette products. However, the cross-sectional nature of these data limit our ability to assess causal pathways. Longitudinal studies that assess trajectories of tobacco product initiation and subsequent patterns of use are needed.

Results also revealed important demographic differences related to type of first product tried. Females were more likely to initiate tobacco use with cigarettes and hookah, while males were likely to initiate with cigars and smokeless tobacco. In a study of middle and high school students, Soldz and colleagues found that males were more likely than females

to initiate with cigars, bidis, kreteks, and smokeless but there was no gender differences for cigarette initiation (Soldz, Huyser, & Dorsey, 2003). However, because the study was conducted before the rise of hookah, use of this product was not included. Social norms about product acceptability for each gender may influence trial.

Initiation with smokeless tobacco use was higher among Whites, which is consistent with prevalence data among youth and young adults (U.S. Department of Health and Human Services, 2012). According to data from the 2009 Youth Risk Behavior Survey, Whites had the highest prevalence (11.9%) of current smokeless use compared to Blacks (3.3%), Hispanic or Latinos (5.1%) or those of another race (5.7%). Similarly, based on data from the 2010 National Survey on Drug Use and Health, White young adults had the highest prevalence of current smokeless tobacco use (9.5%) compared to Blacks (0.6%), Hispanic or Latinos (2.2%) or those of another race (3.6%).

Higher levels of maternal education were related to hookah use as a first product, indicating first product trial with hookah is associated with higher socioeconomic status (SES). In a study of emerging tobacco product use by adults, McMillen and colleagues found that higher levels of participant education were associated with having tried hookah (McMillen et al., 2012), again suggesting that hookah use may be associated with higher levels of SES. The findings that hookah use and use as a first product are associated with higher levels of SES are contrary to those for cigarette use, which indicate that cigarette smoking is negatively associated with education and SES. More research is needed to understand this paradoxical relationship between hookah use and SES.

Current cigarette smoking was more likely among those who reported cigarettes as the first product, but less likely among those who reported cigars, hookah or smokeless tobacco as their first product. However, dual or poly tobacco use was more likely among those who initiated with hookah and smokeless tobacco users and less likely among those who initiated with cigarettes. These findings suggest that those who initiate tobacco use with cigarettes may be more likely to continue on as a cigarette smoker and less likely to supplement their cigarettes with other products. For those who begin tobacco use with hookah and smokeless tobacco, they may be more likely to use more than one tobacco product, but less likely to only smoke cigarettes. It may be that those who initiate with products other than cigarettes tend to be experimenters who try multiple products.

An interesting pattern of results emerged for age of initiation. Younger age at initiation (17 and younger) was associated with cigarettes and smokeless tobacco as the first product, while initiation at 18 or older was more likely among those who tried hookah and cigars first. For hookah, this finding may be the result of the popularity of hookah smoking among college students and the concentration of hookah bars around college campuses (Sutfin et al., 2011). Also of note, almost a third of lifetime tobacco users reported their age of initiation was 18 years or older. This is similar to the finding by Rath and colleagues who also found that one third of ever users initiated after the age of 18 (Rath et al., 2012). These findings suggest that some young adults avoid cigarette and smokeless tobacco initiation at a younger age, but go on to experiment with novel products at a later age. Therefore, these novel

tobacco products may introduce adolescents and young adults to nicotine who would have otherwise remained tobacco-free.

Not surprisingly, parental cigarette smoking was associated with cigarettes as a first product. This may be the result of easy access to cigarettes, since cigarettes may be readily available in homes where at least one parent or guardian smokes. Parents who smoke may contribute to perceptions that cigarette smoking is normative. Many studies, including a recent meta-analysis have shown that parental smoking is strongly associated with youth smoking (Leonardi-Bee, Jere, & Britton, 2011). Interestingly, parental cigarette smoking was negatively associated with initiating with hookah. In homes without parental role models who smoke cigarettes, children may reject smoking. However, because hookah smoking is perceived so differently than cigarettes, it may not be as stigmatized as cigarettes, making it attractive even among those who have rejected cigarettes.

Although small sample size limited our ability to conduct multivariable analysis for those who initiated with bidis/kreteks, results from bivariate analyses suggest that more females than males initiate with bidis/kreteks. Additionally, of those who initiated with bidis/kreteks, 19% were of Hispanic ethnicity. Few studies have assessed first product choice of bidis/kreteks, however, some data on use show that for some age groups, use is higher among Hispanics than Whites, albeit differences are small. Data from the 2009 National Youth Tobacco Survey show that Hispanic 6-8th graders and 9-12th graders had higher rates of bidi use compared to Whites (5.1% vs. 2.1%, $p < .05$ for 6-8th graders; 7.4% vs. 4.3%, $p < .05$ for 9-12th graders). Similar differences by race/ethnicity were observed for 6-8th graders who used kreteks (2.5% among Hispanic 6-8th graders vs. 1.4% Whites, $p < .05$) (U.S. Department of Health and Human Services, 2012). With regard to age of initiation among those who first tried bidis/kreteks, just 1% who reported bidis/kreteks as their first product reported age of initiation as 13 or younger. The majority (86%) reported age of initiation as 14-17, and 13% reported age of initiation as 18 or older. More research is needed to better understand factors associated with bidis/kreteks as choice for first tobacco product.

The study findings must be interpreted in light of the limitations. First, this study is cross-sectional and relied upon participant recall of the first tobacco product used. We tried to improve the validity of the results by not using age of initiation to determine the order of product trial. Instead, we asked participants to recall which product they tried first, which may be more salient than age of initiation. However, our findings may still be limited by recall bias. Future studies should include longitudinal studies beginning in early adolescents to capture tobacco product initiation and continue to follow participants to assess subsequent trajectories of tobacco use. Second, this study focused on college students only therefore the results may not be generalizable to other groups of young adults. Additionally, this study was limited to students from colleges in just two states, North Carolina and Virginia, and at least one study has shown regional variation in tobacco use among college students (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). Therefore, the ability to generalize our results may be limited.

By the fall semester of the first year of college, just under half (48.6%) of college students in our sample had tried a tobacco product. Given the morbidity and mortality associated with

tobacco use, this finding is concerning. All of these products contain nicotine, which is highly addictive, and an introduction to nicotine puts users at risk for continued use and addiction (DiFranza & Wellman, 2005). As novel tobacco products continue to become available, especially in a variety of fruit, candy and alcohol flavors, adolescents and young adults have the potential to be introduced to nicotine in several ways. This proliferation of products could undermine the successes by the tobacco control movement to reduce cigarette smoking. Understanding how choice of tobacco product initiation is related to subsequent use patterns is critical for prevention efforts.

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Highlights

- We studied first tobacco product and current cigarette smoking by college students.
- Weighted prevalence of ever use of tobacco was 48.6%.
- Cigarettes were often first products, then cigars, hookah, smokeless, bidi/kreteks.
- About a third of current cigarette smokers initiated with a non-cigarette product.
- Demographic differences in first tobacco product tried are reported.

Table 1
Demographics and Behavioral Characteristics of the Sample of Lifetime Tobacco Users (N=1,656)

Demographics and Behaviors Characteristics % or Mean (SE)	Lifetime Tobacco Users (n=1656)	First Tobacco Product				
		Cigarettes (n=711)	Cigars (n=436)	Hookah (n=320)	Smokeless Tobacco (n=161)	Bidi/Kretek (n=28)
Female gender (vs. male)	56%	66%	42%	66%	12%	69%
White race (vs. non=White)	89%	86%	91%	87%	98%	92%
Hispanic Ethnicity	7%	7%	6%	6%	5%	19%
Mother Education						
College Degree or Higher	63%	53%	68%	69%	62%	85%
Some College or Less	37%	47%	32%	31%	38%	15%
Current Cigarette Smoker	31%	53%	17%	14%	29%	24%
Current Dual or Poly Tobacco User	27%	37%	21%	16%	40%	14%
Age of Initiation						
13 or Younger	9%	15%	7%	1%	15%	1%
14-17	61%	70%	54%	51%	73%	86%
18 or Older	30%	15%	39%	47%	12%	13%
Parental Cigarette Smoking (vs. no)	20%	30%	16%	13%	18%	8%

Table 2

Weighted Prevalence of First Tobacco Product by Gender and Among Current Cigarette Smokers (N=1,659)

First Tobacco Product	Lifetime Tobacco Users (N=1,656)	Females (N=757)	Males (N=899)	Current Cigarette Smokers (N=743)
Cigarette	37.9%	44.8%	29.2%	65.0%
Cigar	29.3%	21.9%	38.5%	16.4%
Hookah	24.6%	29.2%	18.7%	11.1%
Smokeless Tobacco	6.1%	1.3%	12.0%	5.7%
Chewing Tobacco	0.9%	0.3%	1.6%	0.7%
Moist Snuff/Dip	4.3%	0.7%	8.9%	4.7%
Snus	0.8%	0.2%	1.5%	0.2%
Dissolvables	0.0%	0.0%	0.1%	0.1%
Bidi/Kretek	2.2%	2.7%	1.5%	1.7%
Electronic Cigarettes	0.0%	0.0%	0.0%	0.0%

Table 3
Multivariable Logistic Regression Models Predicting Product Initiation (N=1,656)

	Initiate Cigarettes vs. All Other Tobacco Products		Initiate Cigars vs. All Other Tobacco Products		Initiate Hookah vs. All Other Tobacco Products		Initiate Smokeless vs. All Other Tobacco Products	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Correlates								
Female (vs. Male)	2.06	1.52, 2.80	0.43	0.28, 0.66	2.21	1.54, 3.19	0.09	0.06, 0.16
Non-White (vs. White)	1.54	0.98, 2.42	0.65	0.21, 1.98	1.53	0.57, 4.16	0.11	0.03, 0.46
Hispanic (vs. non-Hispanic)	1.18	0.68, 2.03	0.97	0.49, 1.89	0.67	0.25, 1.80	1.03	0.39, 2.71
Mother College Degree or Higher (vs. Some College or Less)	0.66	0.46, 0.94	1.18	0.80, 1.74	1.35	1.07, 1.71	0.74	0.51, 1.09
Current Cigarette Smoker	7.28	5.31, 9.97	0.33	0.24, 0.47	0.30	0.20, 0.44	0.46	0.32, 0.68
Current Dual or Poly Tobacco Use	0.55	0.39, 0.76	1.20	0.92, 1.57	1.51	1.04, 2.20	1.65	1.06, 2.56
Age of Initiation 13 or Younger (vs. 18+)	5.62	3.59, 8.81	0.62	0.38, 1.02	0.08	0.03, 0.16	5.90	3.32, 10.50
Age of Initiation 14-17 (vs. 18+)	2.91	2.18, 3.87	0.61	0.44, 0.84	0.46	0.32, 0.66	3.47	2.40, 5.03
Parental Cigarette Smoking (vs. no)	1.92	1.36, 2.70	0.80	0.52, 1.22	0.61	0.44, 0.84	0.92	0.61, 1.39