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Adolescent dual-product users: Acquisition and situational use of cigarettes and cigars

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Abstract

Background—Little is known about how adolescents who smoke both cigarettes and cigar products obtain and use these products. This study sought to explore cigarette and cigar acquisition and situational use among high school smokers.

Methods—Data are drawn from the 2011 Cuyahoga County Youth Risk Behavior Survey. Analysis was limited to youth who smoke cigarettes as well as cigars, cigarillos, and little cigars (CCLC) in the past month (N=649). Consumption of both products was calculated and used to create four subtypes of users based on high or low use of each product (Dual High, Dual Low, High CCLC/Low Cigarette, and Low CCLC/High Cigarette users). Current users were asked to identify situations in which they use cigarettes and CCLCs and ways in which they obtain these products. Data were analyzed overall and by user subtype.

Results—Youth reported acquiring cigarettes and CCLC in similar ways, although youth were more likely to take cigarettes from family members than CCLC (11.1% vs. 4.8%). Several differences were observed between cigarettes and CCLC for situational use. While both products are frequently used in social situations (e.g., with friends), cigarettes were more likely to be used in solitary situations (e.g., before bed). Further, significant differences were observed among the four user subtypes.

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Conflict of Interest
No conflict declared

Contributors

All authors have approved the final article. Erika S. Trapl obtained funding for the data collection; is responsible for the conception, design, and acquisition of data; analysis and interpretation of data; and drafting and revision of the manuscript. Sarah J. Koopman Gonzalez and Craig S. Fryer participated in interpretation of data and drafting and revision of the manuscript.

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Conclusions—Study results highlight important, nuanced differences regarding how young multi-tobacco users obtain and the situational use of such products. Importantly, these findings vary by user subtype, informing future interventions to prevent and reduce smoking among the most vulnerable subgroups of youth.

Keywords

adolescents; smoking; cigarettes; cigars; tobacco; dual use

1. Introduction

Rates of cigarette and cigar, cigarillo, and little cigar (CCLC) use have been declining over the last two decades among adolescents, and rates of current use of both products among high school students are similar, with 10.8% reporting cigarette use and 10.3% for CCLC (Kann et al., 2016). Further, 43.0% of adolescents (12–17 years old) who currently use tobacco report using more than one tobacco product. Cigarette and cigarillo use is the second most common combination of tobacco products for 10.1% of adolescent users of multiple types of tobacco; among multiple tobacco product users, 14% of youth and 22% of adults report using cigarettes with another cigar product (Kasza et al., 2017). Among adults, dual cigarette and CCLC users are more likely to be male, young adults (18–29), non-Hispanic Black, and have lower education levels (Cohn et al., 2015; Richardson et al., 2012). Adult dual cigarette and CCLC users report more symptoms of nicotine dependence than cigarette-only users (Rostron et al., 2016), prompting concern for increased risk of dependence among adolescents reporting dual cigarette and CCLC use. Notably, a significant number of adolescent smokers are using multiple products during adolescence, and earlier age of tobacco initiation is associated with an increased likelihood of being a multiple product user (Soneji et al., 2014). Additional research is needed to inform tobacco control strategies inclusive of CCLC use (Symm et al., 2005) to prevent and reduce smoking among youth, particularly with the extension of the US Food and Drug Administration’s regulatory authority to all tobacco products, including CCLC (Food and Drug Administration, 2016).

In a previous study, we found that the acquisition and use of CCLCs is similar to that of cigarettes as described in other research (Acosta et al., 2008; Castrucci et al., 2002; Hahn et al., 1990; Kaestle, 2009; Proctor et al., 2012; Seo and Huang, 2012; Sussman et al., 1993; Trapl et al., 2016b) with most adolescents, regardless of gender, race, and ethnicity purchasing their own CCLC and using them in social situations (Trapl et al., 2016b). Differences among subgroups were found in sharing and solitary use of CCLCs; females were more likely to share and youth identifying as black or Hispanic were more likely to smoke in solitary situations (Trapl et al., 2016b).

Many youths use more than one tobacco product. Adolescent users of more than one tobacco product are more likely than single product users to think that their close friends use cigarettes, hookah, and cigars as well as to report they would date someone who used these products (Cooper et al., 2016). Additionally, there are differences in the acquisition and use patterns of single product CCLC users and those who use both CCLC and cigarettes; dual

users of CCLC and cigarettes are more likely to use in solitary situations as well as buy and take CCLC compared to CCLC-only users (Trapl et al., 2016b). However, we do not know if dual users are smoking CCLCs and cigarettes in different situations or acquiring each product in different ways, information that could provide additional evidence to inform prevention strategies.

The empirical literature has demonstrated that amount of tobacco consumption is related to smoking patterns, motivations, quitting behaviors, and dependence. While the definition of a light smoker has varied across studies, there are differences demonstrated in the literature between intermittent/light and daily cigarette smokers (Coggins et al., 2009; Tindle and Shiffman, 2011). In their review of studies on intermittent/light smokers, Coggins and colleagues found that smoking behavior of intermittent/light smokers is motivated by positive reinforcement and related to relaxation and socialization (Coggins et al., 2009). Intermittent cigarette smokers are more likely to try quitting than daily smokers, but most are not successful in their quit attempt (Tindle and Shiffman, 2011); in addition, they also tend to demonstrate lower nicotine dependence (Coggins et al., 2009). While research has focused on categorization of an intermittent/light smoker in terms of cigarette use, multiple product users may also be at risk for nicotine dependence even with low cigarette use (Husten, 2009). Moreover, the varying definitions of dual use and different use frequencies further complicate associated risk profiles (Klesges et al., 2011).

A growing body of research has highlighted the trend of dual use of cigarettes and cigars among adolescents, and there is limited understanding of acquisition and situational smoking patterns among this group. Further, given the variation noted above in consumption patterns and correlates, it is unclear how levels of cigarette and CCLC consumption may be associated with unique patterns of acquisition and situational use. Understanding acquisition and situational use among dual product users while taking into account consumption how it varies by demographic characteristics, will inform strategies to reduce adolescent tobacco use, initiation, and potentially address cessation.

Given the rise of dual use of tobacco products and opportunities presented by the FDA's recent regulatory authority of CCLC (Food and Drug Administration, 2016), understanding the situational use and access patterns of dual users could inform strategies to prevent and reduce adolescent CCLC use. Thus, this study focuses on a sample of high school youth who identified as current users of both cigarettes and cigar products and compared their acquisition and situational use of each product. The sample was segmented into four user categories (i.e., Dual High, Dual Low, High CCLC/Low Cigarette, and Low CCLC/High Cigarette users) to understand if smoking patterns are associated with acquisition and situational use.

2. Material and method

2.1. Study design and data collection

Data for this study were drawn from the 2011 Cuyahoga County Youth Risk Behavior Survey (CC-YRBS; Trapl and Frank, 2011); sampling methodology for the overall 2011 CC-YRBS can be found elsewhere (Prevention Research Center for Healthy Neighborhoods,

2012). Of the 54 high schools approached, 40 (74%) agreed to participate. A total of 15,844 students were eligible to complete the survey; 13,945 students participated. Questionnaires that failed quality control standards as established by the Centers for Disease Control and Prevention (Center for Disease Control and Prevention [CDC], 2012) were removed from the data set (n=1196), yielding 12,749 usable survey (80.5%). Student non-response was due to student refusal, absence on the day of survey administration, or parental refusal. The overall response rate was 60%.

The current analyses were restricted to those who identified as past 30-day users of both cigarettes and cigars, cigarillos or little cigars; the analysis was further limited to include students self-identifying as non-Hispanic white, non-Hispanic black or Hispanic due to the small numbers of other racial and ethnic students (<50 students in each group) who were current cigarette and CCLC users. An additional 1149 cases were removed from the sample because smoking status could not be determined, thus resulting in a sample size of 649 participants. This study was approved by the Institutional Review Board at Case Western Reserve University.

2.2. Measures

2.2.1. Demographic characteristics—Student self-report of sex (i.e., male or female), grade level (i.e., 9, 10, 11, or 12), race, ethnicity, and family affluence were assessed as demographic characteristics.

Students were asked two questions to determine race and ethnicity. First, each student was asked whether they were Hispanic or Latino with the forced response of Yes or No. The second question then asked “What is your race?” Students were instructed to select one or more responses to the race question. Response options were: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and White. Students who reported that they were Hispanic or Latino were coded as such regardless of their response to the second question. Students who reported that they were not Hispanic or Latino were separated into one of 3 categories: non-Hispanic White, non-Hispanic Black, and other/multiple races. Analyses were restricted to those identifying as Hispanic, non-Hispanic white, and non-Hispanic black.

Age was reported as 12 years or younger, 13, 14, 15, 16, 17, or 18 years or older. This variable was dichotomized to reflect under 18 years or 18 years and older.

The Family Affluence Scale (FAS) was used as a proxy for socioeconomic status (SES) (Boyce et al., 2006; Currie et al., 2008). The FAS sums responses from the following four items yielding a range from 0–9: sharing a bedroom, family car ownership, family computer ownership, and number of family vacations in a year. In this study, FAS was categorized as low (0–4), medium (5–6), and high (7–9) family affluence (further referred to as SES).

2.2.2. Tobacco use characteristics—Student self-report of age at first cigarette, age at first cigar, first tobacco product, current cigarette use and consumption, and current CCLC use and consumption were assessed as tobacco use characteristics.

Students were asked “How old were you when you smoked a whole cigarette for the first time?” Response options ranged from “8 years or younger” to “17 years or older”. Similarly, age at first CCLC use was assessed by asking “How old were you when you smoked a cigar, cigarillo, little cigar or flavored cigar for the first time?” Response options ranged from “8 years or younger” to “17 years or older.”

To determine first tobacco product used, students were asked “What was the first tobacco product you ever used?” with responses of cigarette; cigar, cigarillo, little cigar or flavored cigar; chewing tobacco or snuff; kretek or clove cigarette; bidi or small cigarette wrapped in tobacco leaf tied with string; waterpipe or hookah; or snus.

To assess current cigarette use, students were asked “During the past 30 days, on how many days did you smoke cigarettes?” Respondents were considered current users if they reported use on one or more days.

To assess current CCLC use, students were asked “During the past 30 days, on how many days did you smoke cigars, cigarillos, little cigars, or flavored cigars, such as Black and Milds, Swisher Sweets, or Phillies?” A survey item that includes cigar brand names has been shown to yield greater endorsement among minority youth (Corey et al., 2014; Nasim et al., 2012; Terchek et al., 2009; Trapl et al., 2011). Respondents were considered current CCLC users if they reported use on one or more days.

We created a continuous consumption variable based on the number of days they smoked (among the past 30 days) and number smoked per smoking day for each product. Students were asked to report how many days of the past 30 days they smoked cigarettes or cigar products separately, with responses (and coding values) including one or two days (1.5), three to five days (4), six to nine days (7.5), 10 to 19 days (14.5), 20 to 29 days (24.5) and all 30 days (30). Students were also asked, “During the past 30 days, on the days you smoked, how many cigarettes did you smoke per day?” (Center for Disease Control and Prevention [CDC], 2012). The same item was asked to assess CCLC (i.e., consumption of “cigars, cigarillos, or little cigars such as Black and Milds, Swisher Sweets, or Phillies”). Response options (and coding values) included less than one per day (0.5), one per day (1), two to five per day (3.5), six to ten per day (8), 11–20 per day (15.5), or more than 20 per day for both items (20). We calculated the product of the number of days smoking and the number of cigarettes or cigars smoked, and then divided this by 30 to determine the average number of cigarettes and cigars smoked per day.

We dichotomized each consumption variable into low consumption or high consumption to create four unique consumption groups for ease of interpretation of the results. Evidence from research on light and intermittent cigarette smokers was used to inform our high and low smoking categories (Coggins et al., 2009). High consumption of cigarettes was defined as five or more per day on average and high consumption of cigars was defined as two or more per day on average. These limits defined the high and low user categories for both products, allowing creation of (1) high cigarette-high CCLC; (2) high cigarette-low CCLC; (3) low cigarette-high CCLC; and (4) low cigarette-low CCLC.

2.2.3. Cigarette acquisition—Participants were asked “How do you usually get your own cigarettes?” Response options included: a) I bought them at a store such as a convenience store, supermarket, discount store, or gas station; b) I bought them from another person (not from a store); c) I gave someone else money to buy them for me; d) I borrowed or shared with someone else; e) a person 18 or older gave them to me; f) I took them from a store; g) I took them from a family member, and h) I got them some other way. Responses were modeled after the National Youth Tobacco Survey (Centers for Disease Control and Prevention[CDC], 2011); participants could select all appropriate responses.

2.2.4. Cigar acquisition—Similar to the item above, students were asked “How do you usually get your cigars?” Response options and coding were identical to cigarette acquisition.

2.2.5. Cigarette situational use—Students were asked “In which of the following situations do you use cigarettes?” Response options included: a) When I am with friends, b) When I am at a party, c) When I drink alcohol, d) Just before or after school, e) When I study, f) Around my parents, g) When I wake up, h) Before bed, i) When I feel hungry, and j) After I eat. Students could select all appropriate responses.

2.2.6. Cigar situational use—Similar to the item above, students were asked “In which of the following situations do you use cigars?” Response options and coding were identical to the item above.

2.3. Analytic methods

The SPSS software (version 24 for Windows; IBM Corp., Armonk, NY, 2016) was used for weighted data analysis to account for the complex multistage probability sampling design. Prevalence estimates and confidence intervals were calculated for all demographic variables. Rao-Scott chi-square tests (design-adjusted version of a Pearson Chi-square test) were adopted to determine significant differences between groups. To assess differences by consumption, we ran complex samples logistic regressions for each mode of acquisition and use situation, including cigarette consumption, CCLC consumption, and the interaction term. Significance for the consumption variables was set at $p < .05$; as interaction analysis was exploratory, interactions with $p < .10$ were considered noteworthy. If significant associations were noted for these logistic regressions, a second set of logistic regressions was run using the consumption group variable; three logistic regressions were run for each mode of acquisition and use situation to test all possible contrasts. Differences across groups were noted at a significance of $p < .05$.

3. Results

3.1 Overall descriptives and demographic differences

As shown in Table 1, among the $N=649$ high school youth identified as concurrent cigarette and CCLC smokers, 63.0% were male, 76.9% were White, and 37.5% reported high family affluence. Mean age reported for first cigarette was just over 13 years, while mean age for first CCLC was almost 13.5 years. A majority of youth (59.7%) reported using cigarettes as

their first tobacco product. Among this group, a majority reported smoking less than five cigarettes per day, with roughly 20% reporting smoking one or fewer cigarettes on the days that they smoke. Almost 12% reported smoking half a pack or more on the days they smoked cigarettes (data not shown). Conversely, 38% of smokers reported smoking one or fewer CCLC on the days that they smoked, with 9.9% reporting smoking 6 or more CCLCs on the days that they smoked (data not shown). Overall, a quarter identified as high cigarette smokers and 15.4% were high CCLC smokers. Most participants were low cigarette/low CCLC (i.e., dual low) smokers (67.3%), and 7.9% were high cigarette/high CCLC (i.e., dual high) smokers. Significant differences existed across user categories by race, ethnicity, SES, age, and first tobacco product. Black youth were most likely to be low cigarette/high CCLC users, white youth were most likely to be in one of the low CCLC categories (dual low or high cigarette/low CCLC), while Hispanic youth were mostly likely to be dual high users compared to other user categories. Participants 18 and older were more likely to report a high cigarette category compared to other user categories. A majority of dual low smokers and high cigarette/low CCLC smokers reported cigarettes as their first tobacco product, while a majority of low cigarette/high CCLC smokers reported CCLCs as their first product. Generally speaking, a majority of dual high users report some other tobacco products (e.g., smokeless, hookah, e-cigarette) as their first tobacco product. Age at first cigarette and first cigar was also much younger for dual high users compared to the three other groups.

3.2 Overall acquisition and use of cigarettes and CCLC

Table 2 displays how users reported acquiring each product and the situations in which they use each product. Over a third of dual users reported buying both cigarettes and CCLC at a convenience store; among youth under 18 years, this was 28% for both products. Nearly 30% of dual users asked someone else to buy the product for them. Dual users also reported similar rates of borrowing or sharing cigarettes and CCLC. There were no significant differences in how users reported acquiring their cigarettes and CCLC with the one exception; dual users were significantly more likely to take cigarettes from family members than CCLC (11.1% vs. 4.8%). Dual users typically acquired both products in the same mean number of ways.

Several differences were noted in situational uses between cigarettes and CCLC among dual users. While use with friends and at a party was similarly high for both cigarettes and CCLC, use while drinking alcohol was significantly higher for cigarettes compared to CCLC (44.7% v. 33.9%). Cigarette use was also higher than CCLC use when used just before or after school, when studying, upon waking, before bed, and notably, with or around parents. Dual users reported using cigarettes in more situations than cigars (mean of 3.62 vs. 2.58 respectively).

3.3 Product acquisition by user type

Table 3 examines cigarette and CCLC access across the four user types and presents significance for continuous consumption variables as well as differences across the four user types. Looking across sub-types, there are notable differences in how each sub-type accesses both cigarettes and CCLC. For both cigarettes and CCLC, the three most common ways to obtain cigarettes and CCLC included buying at a store, asking someone to buy, and

borrowing or sharing. The only exception to this was among dual high users, where over 50% reported taking cigarettes from a store and 40% reported taking CCLC from a store. For both cigarettes and CCLC, dual high users reported a significantly higher mean number of ways to get tobacco products compared to the other three user groups. Within user groups, access to cigarettes and CCLC was similar with few exceptions. Dual low, low cigarette/high CCLC, and high cigarette/low CCLC users were all more likely to take cigarettes from family members as opposed to CCLC; dual high users took cigarettes and CCLC from family at similar rates.

3.4 Situational use by user type

Situational use across the four user types is shown in Table 4; significance for continuous consumption variables as well as differences across the four user types is presented. Generally, the most reported situations for using both cigarettes and cigars tend to be social, such as with friends or at a party. Cigarette consumption was significantly associated with all use situations of cigarettes, and in many situations, there was a significant interaction effect. CCLC consumption was significantly associated with six of the 10 use situations of CCLC, yet only one interaction was noted. With the exception of low cigarette/high CCLC users, the user groups generally reported greater endorsement and a higher mean number of ways in which they use cigarettes compared to CCLC. Few dual low smokers reported smoking cigarettes or CCLC with their parents; however, the other three groups reported substantially higher rates of smoking with parents. Over half of dual high smokers reported smoking cigarettes with parents, while nearly 44% reported smoking CCLC with parents. Dual high and high cigarette/low CCLC groups were more likely to report using cigarettes while studying, before or after bed, when hungry or after eating compared to dual low and low cigarette/high CCLC smokers. Similarly, dual high and low cigarette/high CCLC groups were more likely to report smoking before or after school, when studying, before or after bed, when hungry or after eating compared to dual low and high cigarette/low CCLC smokers.

4. Discussion

This study established that dual-user youths are not homogenous in their consumption of cigarettes and CCLC, and distinct patterns of product acquisition and situational use emerged. Notably, the majority of dual-using youth appear to consume lower amounts of both cigarettes and CCLC, access their tobacco in a limited number of ways, and use in mostly social situations. However, roughly a third of youth in our sample reported higher consumption of at least one tobacco product, with corresponding increases in the number of ways those products are accessed and situations in which they are used.

Overall, we noted that dual-users in our sample were more likely to be male; this is consistent with other literature examining CCLC use among adult current cigarette smokers (Cohn et al., 2015; Messer et al., 2015; Sterling et al., 2016). Across the four user groups, males were more likely to be dual-high users or low cigarette/high CCLC users. There were also notable patterns by race and ethnicity, with Hispanic youth disproportionately identifying as dual-high smokers and African-American as low cigarette/high CCLC

smokers. Our previous work (Trapl et al., 2016b) found that Hispanics smoked in more solitary situations, and the current findings indicate that this is likely associated with the large amount of tobacco consumed by these youth. Further, a number of studies have found CCLC use to be more prevalent among youth and young adult African-Americans (Arrazola et al., 2015; King et al., 2013, 2014; Rath et al., 2012; Richardson et al., 2013).

Although cigarettes were the most common first product used, more than half of the low cigarette/high CCLC reported smoking CCLC first, and age at first CCLC was more than a year earlier than first cigarette. A similar pattern emerged for high cigarette/low CCLC. Broadly speaking, these patterns may be indications of reverse gateway and gateway theory, respectively. Dual-low users were the oldest to try both products, which could indicate that this group of users is still early in their progression to higher consumption and potentially nicotine dependence.

In our study, dual-high users start smoking both cigarettes and CCLC at much younger ages than the other three groups. Given the current state of the literature with regard to impact of nicotine on the developing brain, these youth may be at greater risk for advanced nicotine dependence. Further, the advanced dependence may be exhibited through having a higher average number of ways to get tobacco (both types) as well as situations where tobacco is used. Dual-high users also have a higher rate of taking CCLC from family members; this is the only group where taking from family is the same for cigarettes and CCLC, potentially indicating a greater likelihood of living within a smoking family. Equally important, it is quite disconcerting that such a large proportion of dual high users report taking from stores—this may exhibit some level of desperation related to dependence and potentially puts youth at risk of other poor outcomes, such as arrest and experience in the juvenile justice system.

Data from this study may provide support for policies that increase the minimum legal age (MLA) for purchase to 21 years. Given that 14–20% of dual-users report getting cigarettes from a person 18 or older and 9–25% report getting CCLC from a person 18 or older, an increase in MLA could reduce access to near-age peers who are currently legally able to purchase.

While these findings fill a notable gap in the literature in understanding cigar and cigarette habits among dual users, there are limitations to the present study. First, while we gained a better understanding of the acquisition and situational use behaviors of this group of young smokers, we do not know if all tobacco products were used unaltered or for other substances (i.e., marijuana). Our previous findings indicate that a significant proportion of cigar product users also modify their cigar products for use with marijuana, thus it is possible that some users included responses relevant for both typical and modified use of cigar products (Trapl et al., 2016a). Second, our data was collected among a geographically limited area. Given the consistency of our localized findings with national studies in other areas of cigar product research (Corey et al., 2014; Trapl et al., 2011) in addition to the paucity of data in this area, we believe that these findings are still extremely valuable in beginning to understand the behaviors of adolescent dual product users. Third, our data were collected in 2011, and tobacco use trends among youth have shifted nationally since that time, which could have an

impact on our results. Yet, tobacco use trends have been relatively stable in Cuyahoga County since 2011, with a slight decline in 2017, which may be reflective of adoption of legislation to increase the legal age to purchase tobacco to 21 within the city of Cleveland (within Cuyahoga County; Trapl et al., 2017). Notably, consumption of both cigarettes and CCLC was positively skewed, yielding a substantial proportion of users who reported limited use of both cigarettes and cigars; this may have reduced our ability to detect significant differences. Finally, our measure of cigar product use included little cigars, cigarillos and cigars; it is possible that acquisition and situational use vary across these product groups.

In conclusion, this study highlights important, nuanced differences regarding how young dual users obtain cigarettes and CCLC and the situational use of such products. Importantly, these findings vary based on patterns of consumption, which can be used to inform future interventions to prevent and reduce smoking among the most vulnerable subgroups of youth.

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Highlights

- Youth reported acquiring cigarettes and cigars in similar ways
- Cigarettes were more likely to be used in solitary situations compared to cigars
- Differences in acquisition and situational use exist among user subgroups

Table 1
Demographic and Tobacco Use Characteristics of Sample, Overall and By User Category

| Demographic Characteristic | Dual Smokers (n=649) | | | | | |
|--|----------------------|---------------------|---------------------------|---------------------------|---------------------------|----------------------------|
| | n | Weighted % (95% CI) | Low Cig/Low CCLC n=375 | Low Cig/High CCLC n=47 | High Cig/Low CCLC n=92 | High Cig/High CCLC n=51 |
| Gender | | | | | | |
| Male | 393 | 63.0 (58.2, 67.5) | 60.9 (54.8, 66.7) | 74.2 (56.4, 86.5) | 65.2 (53.3, 75.5) | 74.0 (55.5, 86.6) |
| Female | 255 | 37.0 (32.5, 41.8) | 39.1 (33.3, 45.2) | 25.8 (13.5, 43.6) | 34.8 (24.5, 46.7) | 26.0 (13.4, 44.5) |
| Race | | | | | | |
| Black | 117 | 17.6 (14.4, 21.3) | 14.6 (10.3, 20.3) | 49.2 (30.3, 68.3) | 4.3 (1.0, 17.6) | 16.7 (8.2, 31.0) |
| White | 442 | 76.9 (72.9, 80.5) | 82.0 (76.5, 86.5) | 43.2 (26.0, 62.2) | 90.3 (80.4, 95.5) | 60.1 (39.5, 77.7) |
| Hispanic | 90 | 5.5 (3.8, 7.7) | 3.4 (2.3, 4.9) | 7.6 (3.6, 15.4) | 5.3 (2.8, 10.0) | 23.2 (8.8, 48.6) |
| Grade | | | | | | |
| 9th | 130 | 18.2 (13.9, 23.5) | 18.2 (12.9, 25.2) | 14.2 (5.9, 30.5) | 17.8 (9.6, 30.6) | 20.9 (10.2, 38.2) |
| 10th | 159 | 22.1 (17.5, 27.4) | 23.8 (18.0, 30.7) | 31.9 (17.9, 50.1) | 13.9 (7.9, 23.3) | 10.3 (4.6, 21.2) |
| 11th | 156 | 25.5 (20.2, 31.7) | 27.3 (21.0, 34.8) | 16.0 (6.9, 33.1) | 23.1 (13.4, 36.9) | 31.2 (17.3, 49.5) |
| 12th | 196 | 34.2 (28.0, 41.0) | 30.6 (23.9, 38.3) | 37.9 (19.9, 59.9) | 45.2 (31.6, 59.5) | 37.6 (21.5, 57.0) |
| Age | | | | | | |
| 18 years old or older | 152 | 25.1 (20.6, 30.3) | 19.9 (15.3, 25.6) | 17.9 (9.3, 31.8) | 36.7 (25.3, 49.7) | 39.2 (20.9, 61.0) |
| Family Affluence | | | | | | |
| Low | 189 | 26.3 (22.6, 30.4) | 21.1 (16.6, 26.4) | 45.5 (27.8, 64.5) | 32.3 (21.7, 45.1) | 35.5 (20.6, 53.9) |
| Medium | 231 | 36.2 (31.6, 41.1) | 40.6 (34.6, 46.8) | 16.1 (7.4, 31.5) | 43.3 (31.0, 56.5) | 13.2 (5.8, 27.2) |
| High | 229 | 37.5 (33.0, 42.1) | 38.3 (32.3, 44.6) | 38.4 (20.1, 60.6) | 24.4 (15.3, 36.5) | 51.3 (33.2, 69.2) |
| Age at first cigarette mean(se) | 643 | 13.18 (.16) | 13.75 (.16) | 13.21 (.41) | 12.62 (.36) | 9.58 (.46) |
| Age at first cigar mean(se) | 636 | 13.45 (.14) | 13.99 (.13) | 11.91 (.35) | 13.56 (.36) | 10.02 (.43) |
| First tobacco product | 363 | 59.7 (54.9, 64.2) | 63.6 (57.2, 69.5) | 31.5 (17.3, 50.3) | 76.5 (64.3, 85.5) | 38.2 (21.7, 58.1) |
| Cigarette CCLC | 138 | 21.1 (17.5, 25.4) | 20.3 (15.6, 26.1) | 53.8 (34.8, 71.7) | 18.8 (10.5, 31.5) | 4.6 (1.2, 15.8) |
| Other tobacco | 126 | 19.2 (15.7, 23.2) | 16.1 (11.9, 21.4) | 14.7 (6.6, 29.7) | 4.7 (1.8, 11.6) | 57.2 (37.6, 74.7) |

| Demographic Characteristic | Dual Smokers (n=649) | | Low Cig/Low CCLC | Low Cig/High CCLC | High Cig/Low CCLC | High Cig/High CCLC |
|----------------------------|----------------------|---------------------|------------------|-------------------|-------------------|--------------------|
| | n | Weighted % (95% CI) | | | | |
| Cigarette Use | | | | | | |
| Low (<5/day) | 469 | 75.3 (70.6, 79.4) | 100% | 100% | -- | -- |
| High (>5/day) | 154 | 24.7 (20.6, 29.4) | -- | -- | 100% | 100% |
| CCLC Use | | | | | | |
| Low (<2/day) | 481 | 84.6 (80.5, 88.0) | 100% | -- | 100% | -- |
| High (>2/day) | 101 | 15.4 (12.0, 19.5) | -- | 100% | -- | 100% |
| User Category | | | | | | |
| Low Cigarette/Low CCLC | 375 | 67.3 (62.2, 72.0) | | | | |
| Low Cigarette/High CCLC | 47 | 7.6 (5.2, 11.1) | | | | |
| High Cigarette/Low CCLC | 92 | 17.2 (13.5, 21.7) | -- | -- | -- | -- |
| High Cigarette/High CCLC | 51 | 7.9 (5.6, 11.1) | | | | |

Table 2

Acquisition and situational use of cigarettes and CCLC among dual users (n=649)

| Acquisition | n | Cigarettes Weighted % (95% CI) | n | Cigars Weighted % (95% CI) |
|---------------------------------------|-----|--------------------------------|-----|----------------------------|
| Bought from a store | 231 | 38.2 (33.5, 43.3) | 240 | 39.3 (34.7, 44.2) |
| Bought from a store (<18) | 134 | 27.9 (23.0, 33.4) | 139 | 28.3 (23.5, 33.7) |
| Bought from someone else | 83 | 10.7 (8.1, 13.9) | 75 | 10.2 (7.7, 13.2) |
| Ask someone to buy for me | 199 | 29.1 (25.1, 33.4) | 182 | 27.8 (23.8, 32.1) |
| Borrowed / shared | 200 | 32.0 (27.6, 36.7) | 175 | 26.3 (22.2, 30.9) |
| Person >=18 gave me | 115 | 14.1 (11.3, 17.4) | 90 | 12.8 (10.1, 16.2) |
| Took from a store | 42 | 5.2 (3.3, 8.0) | 42 | 5.2 (3.4, 7.9) |
| Took from family member | 77 | 11.1 (8.5, 14.4) | 39 | 4.8 (3.2, 7.3) |
| Some other way | 67 | 9.3 (6.6, 13.0) | 58 | 7.8 (5.3, 11.5) |
| Total # Ways Acquired mean(se) | | 1.55 (.06) | | 1.36 (.05) |
| Situational Use | | | | |
| With friends | 428 | 68.6 (64.0, 72.9) | 453 | 71.5 (66.7, 75.9) |
| At party | 361 | 57.0 (52.3, 61.7) | 328 | 50.9 (45.9, 55.9) |
| With alcohol | 358 | 56.5 (51.4, 61.5) | 268 | 41.3 (36.1, 46.8) |
| Before or after school | 251 | 39.6 (35.1, 44.3) | 129 | 19.0 (15.5, 23.2) |
| Studying | 114 | 17.3 (13.9, 21.5) | 66 | 10.8 (7.8, 14.7) |
| After waking up | 162 | 24.5 (20.7, 28.8) | 91 | 12.7 (9.6, 16.4) |
| Before bed | 182 | 27.4 (23.1, 32.3) | 97 | 15.3 (11.8, 19.6) |
| Feel hungry | 97 | 13.6 (10.5, 17.3) | 53 | 7.8 (5.2, 11.5) |
| After eating | 162 | 22.8 (19.0, 27.2) | 73 | 10.5 (7.6, 14.1) |
| With parents | 107 | 15.6 (12.4, 19.6) | 52 | 7.9 (5.4, 11.4) |
| Total # Ways Used mean(se) | | 3.62 (.15) | | 2.58 (.15) |

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Table 3

Cigarette and CCLC Access Among User Types

| | Low Cig/Low CCLC (1) n=375 | | Low Cig/High CCLC (2) n=47 | | High Cig/Low CCLC (3) n=92 | | High Cig/High CCLC (4) n=51 | | Tests of Significance ^e |
|---------------------------------|-------------------------------|-------------------|-------------------------------|-------------------|-------------------------------|-------------------|--------------------------------|-------------------|------------------------------------|
| | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | |
| Cigarettes | | | | | | | | | |
| Bought at store | 117 | 32.2 (26.3, 38.6) | 22 | 47.0 (29.0, 65.8) | 50 | 60.5 (47.4, 72.2) | 18 | 40.4 (23.2, 60.5) | <i>b, d</i> 13 |
| Bought from someone else | 47 | 10.6 (7.5, 14.7) | 4 | 5.9 (1.7, 18.3) | 14 | 15.4 (7.8, 28.1) | 10 | 13.3 (5.7, 28.0) | NS |
| Ask someone to buy for me | 265 | 61.3 (52.1, 69.9) | 13 | 35.1 (17.3, 58.2) | 38 | 33.4 (23.1, 45.6) | 21 | 39.2 (22.8, 58.5) | NS |
| Borrowed / shared | 137 | 36.7 (30.9, 42.9) | 11 | 32.4 (14.9, 56.7) | 21 | 19.6 (11.8, 30.8) | 15 | 34.4 (17.7, 56.0) | NS |
| Person >= 18 gave me | 62 | 14.0 (10.4, 18.6) | 8 | 13.8 (6.0, 28.5) | 18 | 16.3 (9.2, 27.4) | 16 | 20.4 (10.1, 37.0) | NS |
| Took from a store | 5 | 0.6 (0.2, 1.6) | 2 | 4.9 (1.2, 17.9) | 4 | 3.4 (1.0, 10.4) | 27 | 50.7 (32.4, 68.8) | <i>b, c</i> 12, 13, 14, 34, 24 |
| Took from family member | 42 | 10.9 (7.6, 15.5) | 3 | 4.3 (1.2, 13.6) | 10 | 6.7 (3.4, 12.8) | 14 | 33.2 (16.8, 54.9) | <i>c, d</i> 12, 14, 34, 24 |
| Some other way | 27 | 7.1 (4.2, 11.7) | 6 | 16.9 (3.8, 51.4) | 13 | 13.5 (7.3, 23.8) | 14 | 17.8 (8.4, 33.8) | NS |
| # Ways Acquired mean(se) | | 1.39 (.89) | | 1.60 (.25) | | 1.69 (.17) | | 2.49 (.37) | 14, 24, 34 |
| CCLC | | | | | | | | | |
| Bought at store | 132 | 37.2 (31.2, 43.6) | 24 | 50.0 (31.3, 68.8) | 40 | 45.9 (32.7, 59.6) | 17 | 39.7 (21.9, 60.6) | NS |
| Bought from someone else | 43 | 9.7 (6.9, 13.5) | 4 | 6.8 (2.2, 19.5) | 9 | 7.1 (3.2, 14.9) | 9 | 12.3 (5.0, 27.0) | <i>d</i> NS |
| Ask someone to buy for me | 103 | 26.4 (21.4, 32.1) | 14 | 38.6 (20.4, 60.6) | 25 | 26.9 (17.2, 39.5) | 18 | 34.5 (19.7, 53.1) | NS |
| Borrowed / shared | 118 | 29.3 (24.2, 35.0) | 7 | 24.4 (8.6, 52.6) | 17 | 15.9 (9.4, 25.5) | 16 | 37.8 (21.5, 57.3) | 13, 34 |
| Person >= 18 gave me | 51 | 13.4 (9.8, 18.2) | 5 | 8.6 (3.2, 21.4) | 11 | 10.0 (5.2, 18.5) | 13 | 24.9 (12.4, 43.9) | <i>c, d</i> |
| Took from a store | 7 | 1.8 (0.7, 4.5) | 3 | 8.1 (2.6, 23.0) | 2 | 2.1 (0.4, 9.3) | 24 | 40.3 (23.0, 60.4) | <i>b, c, d</i> 12, 14, 24, 34 |
| Took from family member | 18 | 3.0 (1.6, 4.9) | 1 | 2.0 (0.3, 13.2) | 1 | 0.5 (0.1, 3.5) | 12 | 31.3 (15.2, 53.6) | NS |
| Some other way | 22 | 5.4 (2.9, 10.0) | 6 | 16.9 (3.8, 51.4) | 12 | 11.9 (6.0, 22.4) | 12 | 15.5 (6.8, 31.5) | NS |
| # Ways Acquired mean(se) | | 1.26 (.04) | | 1.56 (.25) | | 1.20 (.07) | | 2.36 (.38) | 14, 24, 34 |

^aFrequencies are unweighted.

^bIndicates that the continuous variable of cigarette consumption is significantly associated with the access type at p<.05

Indicates that the continuous variable of CCLC consumption is significantly associated with the access type at $p < .05$
Indicates that the interaction between cigarette and CCLC consumption is significantly associated with the access type at $p < .10$
Numeric pairs indicate significant differences between the numbered columns

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Table 4

Cigarette and Cigar Situational Use by User Type

| Cigarette Use | Low Cig/Low CCLC (1) n=375 | | Low Cig/High CCLC (2) n=47 | | High Cig/Low CCLC (3) n=92 | | High Cig/High CCLC (4) n=51 | | Tests of Significance ^e |
|----------------------|-------------------------------|-------------------|-------------------------------|-------------------|-------------------------------|-------------------|--------------------------------|-------------------|------------------------------------|
| | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | |
| With friends | 245 | 65.4 (58.8, 71.5) | 29 | 66.8 (49.1, 80.7) | 80 | 92.2 (84.1, 96.3) | 29 | 64.2 (45.6, 79.4) | <i>b,d</i> 13, 23, 34 |
| At party | 203 | 56.9 (50.5, 63.1) | 26 | 47.2 (29.1, 66.0) | 73 | 78.5 (66.3, 87.1) | 29 | 64.8 (45.9, 80.0) | <i>b</i> 13, 23 |
| With alcohol | 199 | 55.0 (48.3, 61.6) | 19 | 39.6 (23.2, 58.6) | 74 | 80.7 (68.9, 88.8) | 30 | 67.8 (49.1, 82.1) | <i>b</i> 13, 23, 24 |
| Before/after school | 101 | 26.2 (21.0, 32.2) | 27 | 68.8 (51.1, 82.3) | 72 | 77.4 (63.4, 87.1) | 32 | 76.0 (58.5, 87.7) | <i>b,d</i> 12, 13, 14 |
| Studying | 27 | 7.2 (4.7, 10.9) | 8 | 16.2 (6.9, 33.4) | 47 | 51.7 (38.5, 64.6) | 24 | 51.3 (33.1, 69.1) | <i>b</i> 12, 13, 14, 23, 24 |
| After waking up | 38 | 9.5 (6.7, 13.4) | 21 | 46.3 (28.3, 65.3) | 63 | 68.0 (54.2, 79.2) | 28 | 63.6 (45.0, 78.9) | <i>b,c,d</i> 12, 13, 14 |
| Before bed | 63 | 15.7 (11.8, 20.6) | 16 | 33.5 (18.5, 52.8) | 65 | 70.8 (57.0, 81.6) | 26 | 54.0 (35.6, 71.3) | <i>b,d</i> 12, 14, 23, 34 |
| Feel hungry | 28 | 7.0 (4.4, 11.0) | 6 | 13.8 (5.2, 31.8) | 35 | 33.3 (23.0, 45.5) | 20 | 38.4 (20.8, 59.7) | <i>b</i> 13, 14, 23, 24 |
| After eating | 53 | 11.5 (8.3, 15.7) | 11 | 22.5 (11.0, 40.6) | 62 | 61.9 (48.2, 73.9) | 26 | 58.4 (40.0, 74.7) | <i>b,d</i> 13, 23, 14, 24 |
| With parents | 22 | 5.5 (3.3, 9.0) | 11 | 23.1 (11.5, 41.1) | 41 | 40.8 (28.7, 54.2) | 24 | 55.8 (37.8, 72.4) | <i>b,c,d</i> 12, 13, 14, 24 |
| # Ways Used mean(se) | | 2.60 (.11) | | 3.78 (.50) | | 6.55 (.41) | | 5.94 (.77) | 12, 13, 14, 23, 24, 34 |
| Cigar Use | | | | | | | | | |
| With friends | 277 | 75.5 (69.7, 80.6) | 35 | 74.8 (57.9, 86.5) | 68 | 72.4 (58.1, 83.3) | 28 | 61.6 (43.7, 76.9) | NS |
| At party | 195 | 52.8 (46.3, 59.1) | 25 | 60.0 (41.7, 75.9) | 51 | 54.8 (42.5, 66.5) | 28 | 58.4 (39.6, 75.0) | NS |
| With alcohol | 151 | 39.0 (32.7, 45.7) | 21 | 54.3 (35.3, 72.1) | 37 | 44.4 (32.6, 56.9) | 29 | 62.6 (43.7, 78.4) | NS |
| Before/after school | 48 | 11.0 (7.8, 15.3) | 23 | 58.4 (40.1, 74.7) | 17 | 19.7 (11.6, 31.6) | 26 | 54.6 (36.0, 72.1) | <i>c</i> 12, 14, 23, 34 |
| Studying | 17 | 4.0 (2.2, 7.1) | 10 | 31.9 (14.3, 56.7) | 7 | 10.4 (4.3, 22.9) | 26 | 59.0 (41.3, 74.6) | <i>b,c</i> 12, 14, 23, 34 |
| After waking up | 25 | 5.1 (3.1, 8.2) | 18 | 45.8 (27.2, 65.7) | 13 | 15.0 (7.8, 26.9) | 25 | 48.1 (29.8, 67.0) | <i>b,c,d</i> 12, 13, 14, 23, 34 |

| Cigarette Use | Low Cig/Low CCLC (1) n=375 | | Low Cig/High CCLC (2) n=47 | | High Cig/Low CCLC (3) n=92 | | High Cig/High CCLC (4) n=51 | | Tests of Significance ^e |
|-----------------------------|-------------------------------|-----------------|-------------------------------|-------------------|-------------------------------|-------------------|--------------------------------|-------------------|--|
| | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | n ^d | % (CI) | |
| Before bed | 34 | 9.7 (6.4, 14.5) | 17 | 41.2 (22.6, 62.6) | 16 | 17.9 (10.1, 29.8) | 20 | 38.6 (21.4, 59.1) | NS |
| Feel hungry | 17 | 3.7 (1.9, 7.1) | 5 | 21.9 (6.6, 52.3) | 5 | 4.2 (1.2, 13.6) | 21 | 42.2 (25.5, 60.9) | ^c 12, 14, 23, 34 |
| After eating | 21 | 4.0 (2.4, 6.5) | 13 | 36.0 (18.2, 58.8) | 11 | 12.6 (5.9, 24.6) | 22 | 46.4 (29.3, 64.5) | ^{b,c,d} 12, 13, 14, 23, 34 |
| With parents | 11 | 2.9 (1.4, 5.6) | 7 | 14.1 (5.6, 31.3) | 7 | 10.3 (4.2, 23.0) | 21 | 43.7 (25.9, 63.3) | ^{b,d} 12, 13, 14, 24, 34 |
| # Ways Used mean(se) | | 2.08 (.10) | | 4.38 (.75) | | 2.62 (.34) | | 5.15 (.82) | 12, 14, 23, 34 |

^aFrequencies are unweighted.

^bIndicates that the continuous variable of cigarette consumption is significantly associated with use situation at p<.05

^cIndicates that the continuous variable of CCLC consumption is significantly associated with use situation at p<.05

^dIndicates that the interaction between cigarette and CCLC consumption is significantly associated with use situation at p<.10

^eNumeric pairs indicate significant differences between the numbered columns