HHS Public Access

Author manuscript

Am J Health Behav. Author manuscript; available in PMC 2017 November 01.

Published in final edited form as:

Am J Health Behav. 2016 November ; 40(6): 761–770. doi:10.5993/AJHB.40.6.8.

Social Norms, Perceptions and Dual/Poly Tobacco Use among Texas Youth

Maria Cooper, PhD,
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

MeLisa R. Creamer, PhD,
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

Christina Ly, PhD,
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

Brittani Crook, PhD,
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

Melissa B. Harrell, PhD, and
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

Cheryl L. Perry, PhD
The University of Texas Health Science Center at Houston (UTHealth), School of Public Health, Austin Campus, Austin, TX

Abstract

Objectives—We assessed risk perceptions and social norms about tobacco use across adolescent non-users of tobacco, single-product users, and dual/poly-product users.

Methods—Use behaviors specific to e-cigarettes, cigarettes, hookah, cigars, and smokeless tobacco were assessed among 6th, 8th and 10th grade students (sample [n] = 3907 from a population of [N] = 461,069 students). Multivariate regression was used to examine differences in these factors across use categories, adjusted for demographic factors.

Results—Results highlight differences between non-users and single- or dual/poly-product users for most tobacco products. Dual/poly-product users differed from single-product users most

Correspondence Dr Cooper; maria.r.cooper@uth.tmc.edu.

Human Subjects Statement
The University of Texas Health Science Center's Institutional Review Board approved this study (reference number HSC-SPH-13-0377). For participating schools, district and principal approval, and where appropriate, the school's Institutional Review Board approval, was obtained.

Conflict of Interest Statement
None of the authors has any competing interests.

notably in their higher perceived use of tobacco products by close friends and dating partners, and a higher proportion of single-product users reported most products were not harmful and not addictive compared to non-users. Few differences were seen between dual/poly-product users and single-product users in their perceptions of harm and addictiveness.

Conclusions—Findings demonstrate the importance of proximal social influences (ie, close friends and dating partners) for adolescent dual/poly-tobacco product users. Understanding similarities and differences in risk factors between these adolescent groups can guide effective public health prevention and treatment programs.

Keywords

tobacco use; adolescents; dual use; poly-tobacco use; adolescent tobacco use

Adolescent tobacco use remains a significant problem both in the United States (US) and Texas, despite declines in current use of conventional cigarettes since the 1998 Master Settlement Agreement. Among high school students in the US and Texas, there have been significant declines in the current (ie, past 30 day) use of cigarettes, cigars, and smokeless tobacco.[1] However, e-cigarette and hookah use have increased drastically in the past few years and now surpass that of conventional cigarettes.[2] In 2014 in Texas, nearly 25% of middle school and high school students reported ever use of an e-cigarette and 14% reported past 30-day use; these numbers are higher than national estimates.[2,3]

With the increasing diversity of tobacco and nicotine products available, use of 2 or more tobacco products is also concerning. National estimates in 2013 suggest that among high school students, half of male tobacco users and 38% of female tobacco users used more than one tobacco product.[1] In Texas, results from the Texas Youth Tobacco Survey indicated that among current e-cigarette users nearly 50% were also current cigarette smokers.[3] Particularly concerning is evidence showing that use of multiple tobacco products increased the likelihood of engaging in other drug or alcohol-related behaviors.[4,5] Also concerning is the potential for long-term use of tobacco products, given their mutual reinforcement of nicotine, a highly addictive substance that is harmful even during adolescence, especially for brain development.[6]

Perceptions about the health risks and social benefits of using tobacco products play a critical role in influencing an individual's decision to engage in such a behavior. The Integrated Behavioral Model, an extension of the Theory of Planned Behavior, posits that behavior is influenced by several constructs, including attitudes toward the behavior and perceived social norms.[7] Social norms encompass both descriptive norms and injunctive norms. The former addresses beliefs about whether others approve or disapprove of the behavior, and the latter is specific to beliefs about whether others perform the behavior. Each has been found to be a potent predictor of youth tobacco use, especially cigarette smoking.[8] Included in the Integrated Behavioral Model's theoretical framework highlighting the role of an individual's attitude, is the idea that beliefs about performing a behavior are associated with certain outcomes. As such, beliefs or perceptions about the future consequences of a particular behavior (ie, the likelihood harming one's health) have been shown to be important factors in predicting various health behaviors, including smoking.[9]

Most of the literature on risk perceptions, social norms, and tobacco use focuses on factors associated with single-product use alone, and is especially plentiful for conventional cigarette smoking only.[10,11] However, studies have begun to look at these factors as they relate to the use of new and emerging tobacco products such as electronic cigarettes. Although Barrington-Trimis et al assessed e-cigarette and cigarette social norms and perceptions in a cohort of 11th and 12th graders and determined that family member use of each product, friend's use of each product, and positive attitudes toward each product had positive associations with use of each product separately, more research is needed to assess factors associated with their dual use.[12] Regarding perceptions, a majority of e-cigarette users tend to believe that e-cigarettes are safer, less harmful, and less addictive than conventional cigarettes.[13–18] Typically, these beliefs are held by younger people, men, and current smokers.[13,15,19] Additional research has shown that among those young adults exposed to e-cigarette marketing, those who are more receptive to the marketing were more likely to believe that e-cigarettes are less harmful.[19]

Whereas current evidence suggests that risk perceptions and social norms are associated with youth use of a single tobacco product,[10,12,20] we have a limited understanding of how these perceptions may differ between single- versus dual/poly-tobacco users. One exception is a study that found that e-cigarette dual users (e-cigarettes and cigarettes) had lower harm perceptions for most tobacco products as compared to exclusive e-cigarette users and higher perceived peer use of cigarettes compared to exclusive users.[21] Another study demonstrated that perceived tobacco use among peers increased with the number of products used by youth, and multiple-tobacco product users were less likely to perceive harm from tobacco products compared to single-product users.[22]

Given the increased risks associated with the use of 2 or more tobacco products among youth – other high-risk behaviors, nicotine addiction, health outcomes – it seems critical to examine more closely why young people might use products concurrently, as a guide to future intervention and policy efforts. Comparing dual/poly-product users to single-product users in regards to their psychosocial risk profiles may also provide additional insights to help target interventions effectively.

The purpose of this study is to build on this emerging body of literature by comparing and contrasting social norms and risk perceptions related to single-product and dual/poly-product use. Social norms considered here include both descriptive norms (ie, perceived prevalence) and injunctive norms (ie, perceived acceptability) and perceptions include beliefs about the likelihood of an outcome occurring given engagement in a behavior (ie, perceived harm). We assess these factors specific to a number of tobacco products, including e-cigarettes, cigarettes, hookah, cigar products (little filtered cigars, cigarillos, large cigars), and smokeless tobacco across 3 classifications of adolescent users: non-users, single-product users, and dual/poly-product users. We hypothesize that youth in the dual/poly-product user group will have decreased perceived risk and increased social norms for each tobacco product compared to both groups, and that single-product users will have decreased perceived risk and increased social norms compared to non-users. The results of this comparison should shed light on differences and similarities among these categories of

tobacco product users, which can guide the development of future preventive as well as treatment interventions for this age group.

METHODS

Study Design

The Texas Adolescent Tobacco and Marketing Surveillance system (TATAMS) is a rapid response surveillance system currently being implemented with middle and high school students in the 4 largest cities in Texas—Austin, Houston, San Antonio, and Dallas/Ft. Worth. This study is a cross-sectional analysis of baseline data (wave 1) from TATAMS, collected during the 2014–2015 academic year.

Data from The Texas Education Agency, the Texas Private School Accreditation Commission, and the National Center for Education Statistics were used to generate a sampling frame representative of school enrollment in the 5 counties surrounding the 4 largest metropolitan areas in Texas. The sampling frame included 461,069 students from public, private and charter schools in these 5 counties who were in 6th, 8th, and 10th grades at baseline. A complex, multistage, probability-design sample of public schools was taken using probability proportional to the grades' enrollment, and later, all private and charter schools were invited to participate. This sampling procedure and associated weighting methods are described in their entirety elsewhere.[23] Altogether, 79 schools agreed to participate.

A point person (eg, teacher, school counselor) was identified at each participating grade level and asked to recruit at least 55 students from each participating grade. This contact person was provided a $100 incentive to reimburse them for their time and effort. Some 10th grade high school classes had students from 9th grade who were allowed to participate in the study to ease classroom burden. Active parental consent and active student assent were obtained. Students received a $10 incentive upon completion of the survey. The baseline (ie, wave 1) survey was administered between October 2014 and June 2015 (sample [n] = 3907 from a population of [N] = 461,069 students) using a computerized form on tablets. Approximately half of youth were boys (51.1%), and 32.2% were in 6th grade, 34.7% were in 8th grade, and 33.1% were in 10th grade. The breakdown of race/ethnicity was as follows: Hispanic (54.5%); white/other (27.9%); and black (17.6%).

Instrument

Survey questions were developed from a catalogue of measures used in state and national tobacco surveillance, including the Population Assessment of Tobacco and Health (PATH) study currently underway by the US Food and Drug Administration (FDA).[24–26] A preliminary survey draft was reviewed by a panel of 6 leading experts with extensive experience in tobacco control, measurement, and survey design to establish face validity of the instrument. Additional cognitive interviewing was conducted between April and July 2014 with 27 students, ages 11 to 18, to ensure clear understanding of survey questions and full-color photographs of tobacco products. Modifications to the instrument were made based on the expert review and the cognitive interviews.

The final survey instrument includes more than 340 questions specific to demographic factors, tobacco use behaviors (ie, e-cigarettes, cigars and cigarillos, little filtered cigars, smokeless tobacco, hookah, and cigarettes), cognitive and affective factors (eg, perceptions of harm), and self-reported exposure to tobacco marketing (eg, at retail outlets and in magazines and newspapers). Full-color photographs of the products were included to assist participants with their recognition of tobacco products, and skip patterns were programmed into the survey to reduce participant burden.

Measures

Tobacco use categories—Adolescents were divided into 3 tobacco use categories: non-users, single-product users, and dual/poly-product users. To measure current tobacco product use, all respondents received the following question for each product: “DURING THE PAST 30 DAYS, on how many days did you smoke/use [tobacco product]?” Adolescents who reported that they did not use any tobacco product on any days in the past 30 days were the “non-user” group. Adolescents who reported that they used one tobacco product on at least one day in the past 30 days were the “single-product” group. Adolescents who reported that they used 2 or more tobacco products on at least one day in the past 30 days were the “dual/poly-product” group.

Social norms—Items measuring peer use and close friends use were included to capture descriptive norms. To measure peer use, adolescents were asked: “How common is it for people your age to smoke/use _____?” for each tobacco product. Responses were given on a 1–5 scale ranging from “not at all common” to “very common.” To measure close friends’ use, adolescents were asked: “How many of your close friends smoke/use _____?” for each tobacco product. Responses were given on a 1–5 scale ranging from “none” to “all.” Items measuring perceived acceptability by dating partners and peers were included to capture injunctive norms. To measure perceived acceptability by dating partners, adolescents were asked to respond to, “I would date someone who uses/smokes _____” for each tobacco product. Responses were given on a 1–5 scale ranging from “disagree” to “agree.” Finally, to measure perceived acceptability by peers, adolescents were asked: “Do you think it is okay for people your age to smoke/use _____?” for each tobacco product. Responses were given on a 1–5 scale ranging from “definitely not” to “definitely yes.”

Risk perceptions—To measure tobacco product harm perceptions, adolescents were asked: “How harmful are these products to health?” for each product. Participants were asked to choose among 4 categories of responses ranging from “not at all harmful” to “extremely harmful.” To measure perceived addictiveness of tobacco products, adolescents were asked: “How addictive are _____?” for each product. Responses included, “not at all addictive,” “somewhat addictive,” and “very addictive.” For both variables, responses were dichotomized so that adolescents who chose “not at all” were coded as 0 and all other responses were coded as 1.

Covariates—Other covariates included: sex, grade, race/ethnicity (Hispanic, non-Hispanic white/other, and non-Hispanic black), and family income. Family income was operationalized asking “In terms of income, what best describes your family’s standard of

living in the home where you live most of the time?" and collapsed response categories were: "very well off," "living comfortably," and "just getting by/nearly poor/poor."

Data Analysis

Multiple regression was conducted to test the study's aims. For each of the 4 social norms variables, a multiple linear regression model was conducted to assess the relationship between tobacco user group and each risk factor. For each of the 2 harm perceptions variables, a multiple logistic regression model was conducted to assess the relationship between tobacco user group and perceived risk. All regression models controlled for sex, grade, race/ethnicity and family income. Adjusted means and proportions were calculated post-estimation and are presented in Tables 2 and 3. *Post hoc* pairwise comparisons with the Bonferroni correction were conducted to compare differences of (1) non-users and single-product users, (2) non-users and dual/poly-product users, and (3) single-product and dual/poly-product users. Differences are reported in terms of statistical significance at the 5% level and effect size. Between group differences are calculated as Cohen's d ($d = M_1 - M_2/s$). Effect sizes are classified as small (d=0.20), medium (d=0.50) and large (d≥0.80).[27]

In addition, all analyses were calculated with sampling weights associated with the complex random sampling procedure to generalize back to the population of students in the sampling frame described above. The sampling weights also account for the clustering of the students within schools and non-response bias at baseline.[23] For the included variables, missing data ranged from 0.15%–4.27%; therefore, sample sizes for each model differed minimally. STATA 14.0 (College Station, TX) was used to conduct all analyses.

RESULTS

Tobacco Use Behaviors

As seen in Table 1, e-cigarettes are the most commonly used product overall (7.4% of youth) and are most frequently used in combination with other products. For example, of youth who currently use cigarettes, 44.6% also currently use e-cigarettes; and of youth who currently use hookah, 64.4% also currently use e-cigarettes. Of youth who currently use e-cigarettes, 21.2% also use conventional cigarettes. Further, 1.1% of youth use more than 2 products (data not shown).

Social Norms

There are significant differences in social factors for various tobacco products across use categories, as seen in Table 2. Regarding descriptive norms, single-product users only perceive e-cigarettes and hookah as more common for their peers to use compared to non-users. Dual/poly-product users perceive e-cigarettes, cigarettes, hookah, and cigars as more common for their peers to use compared to non-users. No differences in this variable between single-product and dual/poly-product users are noted. Both single-product and dual/poly-product users perceive that more of their close friends use e-cigarettes, cigarettes, hookah, and cigars than non-users. Moreover, dual/poly-product users perceive that more of their close friends use cigarettes, hookah, and cigars compared to single-product users. Dual/poly-product users perceive that more of their close friends use smokeless tobacco than non-

users. Large effect sizes (d≥0.80) are seen across all tobacco products, except smokeless tobacco, for the descriptive norms items.

Regarding injunctive norms, single-product users are more likely to report that they would date someone who uses e-cigarettes, hookah, and cigars compared to non-users. Dual/poly-product users are more likely to report that they would date someone who uses e-cigarettes, cigarettes, hookah, and cigars compared to both single-product and non-users. Both single-product and dual/poly-product users are more likely to report that it is okay for their peers to use e-cigarettes, cigarettes, hookah, and cigars than non-users. Further, dual/poly-product users are more likely to report that it is okay for their peers to use hookah than single-product users. Dual/poly-product users are also more likely to report that it is okay for their peers to use smokeless tobacco compared to non-users. Results revealed large effect sizes (d≥0.80) most notably among comparisons for e-cigarette and hookah products.

Risk Perceptions

As Table 3 shows, there are significant differences in risk perceptions of various tobacco products across use categories. Dual/poly-product users are more likely to report that cigarettes and cigars are not at all harmful compared to non-users. Both single-product and dual/poly-product users are more likely to report that e-cigarettes, hookah, and smokeless tobacco are not at all harmful compared to non-users, and large effect sizes (d≥0.80) are noted for the e-cigarette and hookah comparisons. Further, dual/poly-product users are more likely to report that hookah and cigarettes are not at all harmful compared to single-product users. Single-product users are more likely to report that all tobacco products are not at all addictive compared to non-users. Dual/poly-product users are only more likely to report that e-cigarettes and smokeless tobacco are not at all addictive compared to non-users. No differences in dual/poly-product and single-product users are noted for this variable.

DISCUSSION

This study is one of the first to examine the association between social norms and perceptions and tobacco use across multiple tobacco products rather than focusing on one product, such as conventional cigarettes. The tobacco products included in this study were e-cigarettes, cigarettes, hookah, cigar products, and smokeless tobacco. Importantly, the current study makes comparisons across categories of tobacco use behaviors, including non-use, single-product use, and dual/poly-tobacco product use. This approach is especially comprehensive and has been employed in few studies to date.[21,22,28] Here, the approach is applied to a representative sample of 6th, 8th, and 10th grade students in public, private, and charter schools in the 4 largest cities in Texas.

Our findings confirm what is already known generally about the association between perceived social norms and single-product use behaviors, like cigarette smoking.[10,11] However, many comparable studies which have assessed similar risk factors and single- or dual/poly-use of tobacco products did not incorporate increasingly popular products such as e-cigarettes and hookah,[20,29,30] making this study particularly relevant given the limited literature exploring whether these new and emerging products follow the same trend in perceptions and use among youth. Assessing e-cigarettes is particularly imperative, because

both our study and national survey data[2,31] indicate e-cigarettes are now the most commonly used tobacco product among adolescents overall. We find e-cigarettes to be the most commonly used tobacco product among these middle and high school students, as a single-product use category and dual/poly-product use. This suggests that youth may not be using e-cigarettes as a tobacco cessation tool. In fact, with recent research indicating that a large proportion of youth e-cigarette users have never tried cigarettes (greater than 40% of past and current users),[12] it may be possible that e-cigarettes are the new youth "gateway" to nicotine dependence, and may be associated with later or concurrent conventional cigarette and/or other tobacco product use.[32–34] This is evident by the 21% of the e-cigarette users in our sample who also smoke cigarettes. Future longitudinal data will provide more evidence to investigate the gateway possibility.

The results of this study highlight significant group differences in social norms and perceptions for various tobacco products. Dual/poly-product users perceive their close friends' use of smokeless tobacco and their peers' use of e-cigarettes, hookah, cigars, and conventional cigarettes as more common compared to non-users. Both single-product and dual/poly-product users perceive their close friends' use of e-cigarettes and their friends' use of cigars, hookah, and cigarettes as more common compared to non-users. Our results support comparable studies, one which found strong positive associations between friends' use of cigarettes and e-cigarettes with the use of these products,[12] and others, which found a significant association between dual/poly-tobacco product use with perceived prevalence of peer use of those tobacco products.[22,35] As suggested by the Integrated Behavioral Model, single-product users and dual/poly-product users are more likely to have positive peer approval of tobacco product use. It could be that youth are observing their friends use these products, thereby creating a normative belief that such behaviors are appropriate and acceptable.

Dual/poly-product users stand out most notably from single-product users and non-users in 2 social norms domains. Compared to single-product users, they report that more of their close friends use cigars, hookah and cigarettes, but interestingly, were no more likely than single-product users to report a higher perceived prevalence of peer tobacco use. This finding is consistent with research suggesting that adolescents may develop behaviors and beliefs based on social influences and exposure to smoking by peers, which combined with the effects of social norms, could predict adolescents' intentions to smoke or use particular tobacco products.[36] Dual/poly-product users are also more likely to report that they would date someone who used e-cigarettes, cigars, or hookah compared to single-product and non-users. These findings together demonstrate that close friends and dating partners, those who are socially proximal, play a notably influential role in dual/poly-tobacco product use in particular. This finding is consistent with previous studies finding a strong association between norms for proximal referent groups and use of other substances, particularly alcohol.[37–39] Previous social norms research has found that the success of social norms interventions varies by the referent group,[40] and, in fact, norms related to close friends may be the most resistant to change.[41] Nevertheless, these strong associations should be studied further as the landscape of adolescent tobacco use is rapidly changing, and proximal norms should continue to be tested in interventions focusing on new and emerging products and dual/poly-tobacco use. Further, institutional policies, like school-based policies prohibiting

tobacco use, can be effective at changing norms and perceptions. Not all schools have implemented e-cigarette-related policies, such as their inclusion in tobacco free zones, which may help to reduce perceived peer use and social acceptability of these products.[42]

Both single-product and dual/poly-product users within our study are more likely to report e-cigarettes as being not at all harmful and not at all addictive compared to non-users. Also, both single-product and dual/poly-product users are more likely to report that hookah and smokeless tobacco are not at all harmful compared to non-users. Compared to non-users, single-product users are more likely to report that all tobacco products are not at all addictive. Few differences between dual/poly-product users and non-users are noted for youth perceptions about addiction, in contrast. These results reflect those from similar studies that found a strong association or dose-dependent relationship between lower risk, or harm perceptions, and tobacco product use.[12,35,43] In the current study, dual/poly-product users differ minimally from single -product users across comparisons of perceived harm and perceived addictiveness of all tobacco products (with the exception of perceived harmfulness of hookah and cigarettes). This finding is contrary to results from a recent study that found that dual cigarette/e-cigarette users held lower harm perceptions for various products than e-cigarette-only users,[21] but supports findings from another study in which dual cigarette/e-cigarette users did not differ in harm perceptions of e-cigarettes compared to exclusive users.[28] Another study suggested there may be differences in tobacco harm perceptions among youth dual-users and multiple-product users;[22] however, current results are unable to make the distinction between those groups, given small sample sizes. Given these mixed and complex findings, the role of youth's perceptions of harm and addictiveness in dual/poly-tobacco product use should be explored further in future studies.

Strengths and Limitations

This study uses data from a large cohort weighted to represent middle school and high school students in 4 major metropolitan areas in Texas.[23] Questions and constructs in this study are similar to those used by other national studies, including the National Youth Tobacco Survey and PATH,[24,25] but rely on self-report. Analyses are based on cross-sectional data, and therefore, temporal relationships between social norms and perceptions and use of tobacco products cannot be made.

Conclusion

We find tobacco policymakers and researchers in a perpetual race to keep up with a rapidly changing landscape of adolescent tobacco use. As we continue to witness youth transition to using a diverse array of nicotine and tobacco products, it is imperative to assess the patterns of single- versus dual/poly-users as well as the risk factors associated with each user classification. Gleaning the similarities and differences between these classes of users can lead to more tailored, and thus more effective, youth tobacco prevention strategies. This study highlights similarities between single-product and dual/poly-product users, with some differences. Preventive and treatment efforts should prioritize proximal social influences, like close friends and dating partners, when addressing dual/poly-product users, whereas perceived harm and addictiveness need to be a part of interventions targeted to both categories of users.

Acknowledgments

This research was supported by grant number [1 P50 CA180906] from the National Cancer Institute at the National Institutes of Health and the Food and Drug Administration, Center for Tobacco Products (CTP). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the Food and Drug Administration.

References

1. Creamer MR, Perry CL, Harrell MB, Diamond PM. Trends in multiple tobacco product use among high school students. Tob Regul Sci. 2015; 1(3):204–214. [PubMed: 26478907]
2. Arrazola RA, Singh T, Corey CG, et al. Tobacco use among middle and high school students—United States, 2011–2014. MMWR Morb Mortal Wkly Rep. 2015; 64(14):381–385. [PubMed: 25879896]
3. Cooper M, Case KR, Loukas A. E-cigarette use among Texas youth: results from the 2014 Texas Youth Tobacco Survey. Addict Behav. 2015; 50:173–177. [PubMed: 26151581]
4. Everett SA, Malarcher AM, Sharp DJ, et al. Relationship between cigarette, smokeless tobacco, and cigar use, and other health risk behaviors among US high school students. J Sch Health. 2000; 70(6):234–240. [PubMed: 10937370]
5. Creamer MR, Portillo GV, Clendennen SL, Perry CL. Is adolescent poly-tobacco use associated with alcohol and other drug use? Am J Health Behav. 2016; 40(1):117–122. [PubMed: 26685820]
6. Gulley JM, Juraska JM. The effects of abused drugs on adolescent development of corticolimbic circuitry and behavior. Neuroscience. 2013; 249:3–20. [PubMed: 23711583]
7. Montano, DE.; Kasprzyk, D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In: Glanz, K.; Rimer, BK.; Viswanath, K., editors. Health Behavior and Health Education: Theory, Research and Practice. 4th. San Francisco, CA: Jossey-Bass; 2008. p. 67-96.
8. Vitória PD, Salgueiro MF, Silva SA, de Vries H. Social influence, intention to smoke, and adolescent smoking behaviour longitudinal relations. British J Health Psych. 2011; 16(4):779–798.
9. Morrison DM, Spencer MS, Gillmore MR. Beliefs about substance use among pregnant and parenting adolescents. J Res Adolescence. 1998; 8(1):69–95.
10. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. Tob Control. 1998; 7(4):409–420. [PubMed: 10093176]
11. US Department of Health and Human Services. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
12. Barrington-Trimis JL, Berhane K, Unger JB, et al. Psychosocial factors associated with adolescent electronic cigarette and cigarette use. Pediatrics. 2015; 136(2):308–317. [PubMed: 26216326]
13. Zhu S-H, Gamst A, Lee M, et al. The use and perception of electronic cigarettes and snus among the US population. PloS One. 2013; 8(10):e79332. [PubMed: 24250756]
14. Choi K, Fabian L, Mottey N, et al. Young adults' favorable perceptions of snus, dissolvable tobacco products, and electronic cigarettes: findings from a focus group study. Am J Public Health. 2012; 102(11):2088–2093. [PubMed: 22813086]
15. Choi K, Forster J. Characteristics associated with awareness, perceptions, and use of electronic nicotine delivery systems among young US Midwestern adults. Am J Public Health. 2013; 103(3): 556–561. [PubMed: 23327246]
16. Etter JF, Bullen C. Electronic cigarette: users profile, utilization, satisfaction and perceived efficacy. Addiction. 2011; 106(11):2017–2028. [PubMed: 21592253]
17. Goniewicz ML, Lingas EO, Hajek P. Patterns of electronic cigarette use and user beliefs about their safety and benefits: an internet survey. Drug Alcohol Rev. 2013; 32(2):133–140. [PubMed: 22994631]

18. Tan AS, Bigman CA. E-cigarette awareness and perceived harmfulness: prevalence and associations with smoking-cessation outcomes. Am J Prev Med. 2014; 47(2):141–149. [PubMed: 24794422]
19. Pokhrel P, Fagan P, Kehl L, Herzog TA. Receptivity to e-cigarette marketing, harm perceptions, and e-cigarette use. Am J Health Behav. 2015; 39(1):121–131. [PubMed: 25290604]
20. Tercyak K. Psychosocial correlates of alternate tobacco product use during early adolescence. Prev Med. 2002; 35(2):193–198. [PubMed: 12200105]
21. Cooper M, Case KR, Loukas A, et al. E-cigarette dual users, exclusive users and perceptions of tobacco products. Am J Health Behav. 2016; 40(1):108–116. [PubMed: 26685819]
22. Ali M, Gray TR, Martinez DJ, et al. Risk profiles of youth single, dual, and poly tobacco users. Nicotine Tob Res. 2016; 8(7):1614–1621.
23. Pérez, A.; Jackson, C.; Delk, J., et al. Design, Sampling Weights, Reweighting for Unit Nonresponse, and Monitoring of the Texas Adolescent Tobacco and Marketing Surveillance (TATAMS) Study. Joint Statistical Meetings Session 541: Weighting and Design effects, JSM2015 program book, page 222; August 12, 2015; Seattle, WA. Available at: http://www.amstat.org/sections/srms/proceedings/allyears.html
24. US Food and Drug Administration. [Accessed September 15, 2016] The Population Assessment of Tobacco and Health (PATH). 2014. Available at: https://pathstudyinfo.nih.gov/UI/HomeMobile.aspx
25. US Centers for Disease Control and Prevention. [Accessed Septmber 15, 2016] National Youth Tobacco Survey (NYTS). 2012. Available at: http://www.cdc.gov/tobacco/data_statistics/surveys/nyts/
26. Substance Abuse and Mental Health Services Administration. [Accessed September 15, 2016] National Survey on Drug Use and Health. 2011. Available at: https://nsduhweb.rti.org/respweb/homepage.cfm
27. Sullivan GM, Feinn R. Using effect size-or why the P value is not enough. J Grad Med Educ. 2012; 4(3):279–282. [PubMed: 23997866]
28. Wills TA, Knight R, Williams RJ, et al. Risk factors for exclusive e-cigarette use and dual e-cigarette use and tobacco use in adolescents. Pediatrics. 2015; 135(1):e43–e51. [PubMed: 25511118]
29. Nasim A, Blank MD, Cobb CO, Eissenberg T. Patterns of alternative tobacco use among adolescent cigarette smokers. Drug Alcohol Depen. 2012; 124(1–2):26–33.
30. Schuster RM, Hertel AW, Mermelstein R. Cigar, cigarillo, and little cigar use among current cigarette-smoking adolescents. Nicotine Tob Res. 2013; 15(5):925–931. [PubMed: 23072873]
31. Johnston, LD.; O'Malley, PM.; Miech, RA., et al. Monitoring the Future National Results on Adolescent Drug Use: Overview of Key Findings, 2014. Ann Arbor, MI: Institute for Social Research, the University of Michigan; 2015.
32. Primack BA, Soneji S, Stoolmiller M, et al. Progression to traditional cigarette smoking after electronic cigarette use among US adolescents and young adults. JAMA Pediatrics. 2015; 169(11):1018–1023. [PubMed: 26348249]
33. Leventhal AM, Strong DR, Kirkpatrick MG, et al. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. JAMA. 2015; 314(7):700–707. [PubMed: 26284721]
34. Wills TA, Knight R, Sargent JD, et al. Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. Tob Control. 2016 pii: tobaccocontrol-2015-052705. [Epub ahead of print].
35. Lee YO, Hebert CJ, Nonnemaker JM, Kim AE. Youth tobacco product use in the United States. Pediatrics. 2015; 135(3):409–415. [PubMed: 25647680]
36. Tickle J, Niederdeppe J, Jackson C, Farrelly M. Using anti-tobacco industry messages to prevent smoking among high-risk adolescents. Health Educ Res. 2006; 21(3):325–337. [PubMed: 16492681]
37. Lewis MA, Neighbors C. Social norms approaches using descriptive drinking norms education: a review of the research on personalized normative feedback. J Am Coll Health. 2006; 54(4):213–218. [PubMed: 16450845]

38. Korcuska JS, Thombs DL. Gender role conflict and sex-specific drinking norms: relationships to alcohol use in undergraduate women and men. J Coll Stud Dev. 2003; 44(2):204–216.

39. Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: a meta-analytic integration. J Stud Alcohol. 2003; 64(3):331. [PubMed: 12817821]

40. Neighbors C, O'Connor RM, Lewis MA, et al. The relative impact of injunctive norms on college student drinking: the role of reference group. Psychol Addict Behav. 2008; 22(4):576. [PubMed: 19071984]

41. Prince MA, Carey KB. The malleability of injunctive norms among college students. Addict Behav. 2010; 35(11):940–947. [PubMed: 20598806]

42. Winickoff JP, Winickoff SE. Potential solutions to electronic cigarette use among adolescents. Pediatrics. 2016; 138(2) pii: e20161502.

43. Ambrose BK, Rostron BL, Johnson SE, et al. Perceptions of the relative harm of cigarettes and e-cigarettes among U.S. youth. Am J Prev Med. 2014; 47(2 Suppl 1):S53–S60. [PubMed: 25044196]

Table 1

Weighted Prevalence of Dual Use of Tobacco Products (Past 30 day)[a] TATAMS Wave 1 (n = 3907; N = 461,069)

Tobacco Product Prevalence Dual use of:	**E-cigarette 7.41% n = 261, N = 34,091**	**Cigarette 3.49% n = 89, N = 16,025**	**Hookah 2.47% n = 70, N = 11,391**	**Smokeless Tobacco/Large Cigar/Little Cigar[b] 2.31% n = 91, N = 10,632**
E-cigarette 7.41% n = 261, N = 34,091	--	44.63%	64.38%	57.38%
Cigarette 3.49% n = 89, N = 16,025	21.23%	--	28.27%	33.16%
Hookah 2.47% n = 70, N = 11,391	21.51%	20.10%	--	28.40%
Smokeless Tobacco/ Large Cigar/Little Cigar[b] 2.31% n = 91, N = 10,632	17.90%	22.00%	26.51%	--

Note.

[a]This table should be interpreted in the following way. “Of the current e-cigarette users, 21.23% were also current cigarette users.”

[b]Product categories were collapsed as number of respondents (n) in each individual category was <50.

Table 2

Results of Weighted Linear Regression – Social Norms by Tobacco User Groups (Non-user, Single-product User and Dual/Multiple-product User), (n = 3907; N = 461,069)

	Non-user (1) 89.5% (n = 3574; N = 412,677)	Single-product (2) 6.56% (n = 206; N = 30,238)	Dual/Multiple-product (3) 3.94% (n = 127; N = 18,153)		
Descriptive Norms					
How common is it for people your age to smoke/use …[a]	**Mean**[e] **(95% CI)**	**Mean (95% CI)**	**Mean (95% CI)**	**p-value**	**Cohen's d**[f]
E-cigarettes	2.31 (2.23–2.40)	3.04 [A] (2.69–3.39)	2.95 [A] (2.63–3.27)	<.001	1 vs 2: 0.84 vs 3: 0.79 vs 3: 0.00
Cigarettes	2.19 [A] (2.11–2.27)	2.44 [AB] (2.10–2.78)	2.73 [B] (2.43–3.04)	<.001	1 vs 2: 0.38 vs 3: 0.62 vs 3: 0.25
Hookah	2.05 (1.96–2.14)	2.51 [A] (2.17–2.85)	2.90 [A] (2.60–3.20)	<.001	1 vs 2: 0.61 vs 3: 0.94 vs 3: 0.34
Cigars	1.86 [A] (1.77–1.95)	2.12 [AB] (1.85–2.39)	2.60 [B] (2.16–3.05)	<.001	1 vs 2: 0.42 vs 3: 0.81 vs 3: 0.39
Smokeless Tobacco	1.72 [A] (1.64–1.80)	1.91 [A] (1.47–2.35)	2.05 [A] (1.62–2.47)	<.001	1 vs 2: 0.24 vs 3: 0.38 vs 3: 0.14
How many of your close friends smoke / use …[b]					
E-cigarettes	1.49 (1.44–1.54)	2.33 [A] (2.08–2.57)	2.45 [A] (2.08–2.82)	<.001	1 vs 2: 0.95 1 vs 3: 1.03 2 vs 3: 0.15
Cigarettes	1.36 (1.32–1.40)	1.82 (1.65–2.00)	2.35 (1.96–2.74)	<.001	1 vs 2: 0.80 1 vs 3: 0.91 2 vs 3: 0.53
Hookah	1.39 (1.34–1.44)	1.67 (1.48–1.87)	2.39 (2.03–2.74)	<.001	1 vs 2: 0.55 1 vs 3: 1.05 2 vs 3: 0.79
Cigars	1.33 (1.28–1.38)	1.76 (1.48–2.03)	2.38 (1.98–2.78)	<.001	1 vs 2: 0.73 1 vs 3: 1.02 2 vs 3: 0.54
Smokeless Tobacco	1.20 [A] (1.16–1.25)	1.43 [AB] (1.17–1.68)	1.91 [B] (1.51–2.31)	<.001	1 vs 2: 0.42 1 vs 3: 0.62 2 vs 3: 0.57
Injunctive Norms					
I would date someone who…[c]	**Mean**[e] **(95% CI)**	**Mean**[e] **(95% CI)**	**Mean**[e] **(95% CI)**	**p–value**	**Cohen's d**
Uses E-cigarettes	1.50 (1.45–1.55)	2.29 (2.07–2.52)	2.89 (2.41–3.37)	<.001	1 vs 2: 0.76 1 vs 3: 1.12 2 vs 3: 0.48
Smokes cigarettes	1.26 [A] (1.23–1.29)	1.49 [A] (1.26–1.73)	2.30 (1.83–2.76)	<.001	1 vs 2: 0.42 1 vs 3: 1.57 2 vs 3: 0.85

	Non-user (1) 89.5% (n = 3574; N = 412,677)	Single-product (2) 6.56% (n = 206; N = 30,238)	Dual/Multiple-product (3) 3.94% (n = 127; N = 18,153)		
Smoke hookah	1.38 (1.34–1.42)	1.82 (1.64–2.01)	2.78 (2.26–3.30)	<.001	1 vs 2: 0.70 1 vs 3: 1.08 2 vs 3: 0.87
Smokes cigars	1.26 (1.23–1.29)	1.58 (1.41–1.75)	2.27 (1.88–2.67)	<.001	1 vs 2: 0.58 1 vs 3: 0.78 2 vs 3: 0.72
Uses smokeless tobacco	1.22 [A] (1.19–1.24)	1.38 [A] (1.22–1.54)	1.70 [A] (1.31–2.10)	<.001	1 vs 2: 0.29 1 vs 3: 0.47 2 vs 3: 0.29
Do you think it is okay for people your age to smoke/ use ? [d]					
E-cigarettes	1.28 (1.25–1.31)	1.94 [A] (1.78–2.09)	2.24 [A] (1.90–2.58)	<.001	1 vs 2: 0.92 1 vs 3: 1.06 2 vs 3: 0.37
Cigarettes	1.10 (1.08–1.13)	1.34 [A] (1.18–1.51)	1.65 [A] (1.35–1.95)	<.001	1 vs 2: 0.67 1 vs 3: 0.66 2 vs 3: 0.47
Hookah	1.20 (1.17–1.22)	1.53 (1.37–1.69)	1.99 (1.67–2.30)	<.001	1 vs 2: 0.81 1 vs 3: 0.96 2 vs 3: 0.66
Cigars	1.12 (1.09–1.14)	1.44 [A] (1.31–1.58)	1.69 [A] (1.39–1.99)	<.001	1 vs 2: 0.94 1 vs 3: 0.70 2 vs 3: 0.37
Smokeless tobacco	1.11 [A] (1.09–1.13)	1.28 [AB] (1.13–1.43)	1.59 [B] (1.28–1.89)	<.001	1 vs 2: 0.46 1 vs 3: 0.58 2 vs 3: 0.52

Note.
All analyses adjusted for sex, grade, race/ethnicity and family income

[a] Measured on a 1–5 scale from “not at all common” to “very common”

[b] Measured on a 1–5 scale from “none” to “all”

[c] Measured on a 1–5 scale from “disagree” to “agree”

[d] Measured on a 1–5 scale from “definitely not” to “definitely yes”

[e] Adjusted means were calculated post-estimation. Regression coefficients are available on request. Means in cells sharing a letter are not significantly different at the 5% level; p-value adjusted with Bonferroni correction

[f] Effect sizes are classified as small (d=0.20), medium (d=0.50) and large (d≥0.80)

Table 3

Results of Weighted Logistic Regression - Risk Perceptions by Tobacco User Groups (Non-user, Single-product User and Dual/Multiple-product User), (n = 3907; N = 461,069)

	Non-user (1) 89.5% (n = 3574; N = 412,677)	**Single-product (2) 6.56% (n = 206; N = 30,238)**	**Dual/Multiple-product (3) 3.94% (n = 127; N = 18,153)**		
% reporting ____ not at all harmful to health[a]	**%**[c] **(95% CI)**	**% (95% CI)**	**% (95% CI)**	**p-value**	**Cohen's d**[d]
E-cigarettes	14.22 % (12.92%–15.52%)	43.27 % [A] (34.41%–52.13%)	53.26 % [A] (41.05%–65.47%)	<.001	1 vs 2: 0.71 vs 3: 0.98 vs 3: 0.27
Cigarettes	6.57 % [A] (5.34%–7.80%)	6.27 % [A] (2.39%–10.15%)	21.04 % (7.86%–34.22%)	<.001	1 vs 2: 0.10 vs 3: 0.45 vs 3: 0.67
Hookah	10.44 % (9.19%–11.70%)	21.72 % (12.47%–30.97%)	42.41 % (29.40%–55.41%)	<.001	1 vs 2: 0.42 vs 3: 0.81 vs 3: 0.61
Cigars	6.73 % [A] (5.48%–7.99%)	11.89 % [AB] (4.28%–19.51%)	23.95 % [B] (11.32%–36.59%)	<.001	1 vs 2: 0.15 vs 3: 0.62 vs 3: 0.32
Smokeless	7.06 % (5.61%–8.50%)	14.85 % [A] (8.15%–21.54%)	26.48 % [A] (12.98%–39.97%)	<.001	1 vs 2: 0.19 vs 3: 0.64 vs 3: 0.39
% reporting ____ not at all addictive[b]					
E-cigarettes	54.29 % (49.87%–58.70%)	71.75 % [A] (62.35%–81.15%)	70.66% [A] (60.33%–81.00%)	<.001	1 vs 2: 0.32 vs 3: 0.31 vs 3: 0.01
Cigarettes	46.61 % [A] (42.36%–50.86%)	59.25 % [B] (48.49%–70.02%)	57.58 % [AB] (43.46%–71.70%)	<.001	1 vs 2: 0.17 vs 3: 0.15 vs 3: 0.02
Hookah	54.29 % [A] (49.68%–58.90%)	72.77 % [B] (63.62%–81.91%)	64.07 % [AB] (52.60%–75.54%)	<.001	1 vs 2: 0.32 vs 3: 0.15 vs 3: 0.20
Cigars	49.00 % [A] (44.46%–53.56%)	31.53 % [B] (22.00%–41.06%)	35.84 % [AB] (23.87%–47.81%)	<.001	1 vs 2: 0.27 vs 3: 0.20 vs 3: 0.09
Smokeless	51.93 % (47.83%–56.04%)	72.60 % [A] (64.40%–80.80%)	69.39 % [A] (58.52%–80.27%)	<.001	1 vs 2: 0.35 vs 3: 0.30 vs 3: 0.07

Note.
All analyses adjusted for sex, grade, race/ethnicity and family income.

[a] Measured on a 1–4 scale from "not at all harmful" to "definitely harmful." Responses were collapsed into 2 categories: "Not at all" harmful versus "some" harm

[b] Measured on a 1–3 scale from "not at all addictive" to "very addictive." Responses were collapsed into 2 categories: "Not at all" addictive versus "some" addictiveness.

[c] Adjusted proportions were calculated post-estimation. Regression coefficients are available on request. Proportions in cells sharing a letter are not significantly different at the 5% level; p-value adjusted with Bonferroni correction

[d] Effect sizes are classified as small (d=0.20), medium (d=0.50) and large (d≥0.80)