

## **ATTACHMENT TWO**

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### Federal and State Advertising Restrictions Respective to Tobacco Products

Topic	Law	Summary
Storefront Advertising	Cal. Business and Professions Code §§ 25612(c)(7), 25617, 25619 (Lee Law)	No more than 33 percent of the square footage of windows and clear (e.g. glass) doors of an alcohol retailer may have advertisement of any sort, including tobacco.
Blunt Wrap Advertising	Cal. Business and Professions Code §§ 22958(a), 22962 (STAKE Act) Cal. Penal Code 308	No person or business may place advertising for blunt wraps lower than four feet above the floor. No person or business offering blunt wrap for sale may place blunt wrap advertising within two feet of a candy, snack, or nonalcoholic beverage display.
State Building Advertising	Cal. Gov't Code § 19994.35	No advertising for any product containing tobacco shall be allowed in any building owned and occupied by the state.
Video Games	Cal. Penal Code § 308.5	The law prohibits paid commercial advertising for alcohol and tobacco products in video games intended for either private use or use in a public establishment, and intended primarily for use by any person under the age of 18 years. Paid commercial advertising includes, for example, containers or packaging, product brand names, trademarks, or copyrighted slogans.
Samples, Coupons, and Promotional Offers	Cal. Health and Safety Code §118950 Cal. Code of Regulations Title 18, § 4081  Cal. Business and Professions Code § 17534, 17535, 17537.3	Free or nominal cost cigarettes or smokeless tobacco products (or coupons, coupon offers, rebate offers, gift certificates, gift cards, or "other similar offers" for such products) may not be distributed on public grounds or private grounds that are open to the public.  Free samples of smokeless tobacco products may not be distributed within a two-block radius of any premises or facility whose primary purpose is directed towards person under the age of 21, including schools, clubhouses, and youth centers, when those premises are being used for their primary purposes.  Promotional offers, mail in and telephone

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		<p>requests for promotional offers must state they are not available to individuals under 21 years of age and must include appropriate efforts to ensure person is at least 21 years of age (asking date of birth).</p> <p>Mailing unsolicited samples of smokeless tobacco as part of an advertising program is prohibited.</p>
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Television/Radio Cigarette Advertising	15 USC §§ 1335, 1338, 1339	The law prohibits advertising cigarettes or little cigars (defined by weight) on any medium of electronic communication subject to the jurisdiction of the U.S. Federal Communications Commission (FCC) (such as television and radio). - Law does not apply to regular size cigars.
Television/Radio Smokeless Tobacco Advertising	15 USC §§ 4402, 404, 4405	The law prohibits advertising smokeless tobacco on any medium of electronic communication subject to the jurisdiction of the FCC (such as television and radio).
<b>Federal Laws on Misleading Consumers, Content Disclosures to Public and Permissible Forms of Advertisement</b>		
Ban on Misleading Consumers about FDA endorsements	21 USC § 331(tt), 333, 372 (Tobacco Control Act)	Illegal to make any express or implied statement to consumers in tobacco product labeling or through the media that would mislead consumers to believing that a tobacco product is: 1) Approved by the FDA; 2) Endorsed by FDA; 3) Deemed safe by the FDA; or 4) Less harmful due to FDA regulation.
Content Disclosures to the Public	21 USC § 387d, 387n (Tobacco Control Act) 15 USC §§ 1333, 1336, 1338, 1339	U.S. Dept. of Health and Human Services (HHS) will determine whether tar or nicotine yields of cigarette and tobacco products must be disclosed on all product packages and advertisements.
Permissible Forms of Labeling and Advertising	21 USC § 333, 372, 387a-l, 387f(d) (Tobacco Control Act) 21 Code of Federal Regulation Section 1140.30(a)	Manufacturer, distributor or retailer must notify FDA 30 days prior to advertising cigarettes or smokeless tobacco in a medium other than the following: 1) Periodicals or other publications; 2) Billboards; 3) Posters and placards; or 4) Promotional Materials (direct mail, POS materials). Notice must disclose exposure to those under the age of 18.



## Martinez, Ruben

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**From:** OUT Tobacco <o...>  
**Sent:** Monday, October 25, 2021 3:56 PM  
**To:** PublicComment-AutoResponse  
**Cc:** director@latinoequalityalliance.com; mreataza@appealforhealth.org; shannon.kozlovich@gmail.com; ryanoda10@gmail.com; hodgekaitlyn@gmail.com; christiang@tramutola.com  
**Subject:** Item 11 - Letter of Support from OUT Against Big Tobacco  
**Attachments:** OABT\_LOS\_Pasadena\_Flavors\_Oct2021.pdf

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To Pasadena City Council,

OUT Against Big Tobacco Los Angeles would like to send a letter of support for Item 11.

Best,  
Eddie Martinez

10/25/2021  
Item 11



October 25, 2021

Pasadena City Council  
City Hall  
100 North Garfield Ave.

Pasadena, CA 91101

**Re: Item 11** – An Ordinance of the City of Pasadena, California Amending the Tobacco Retailer License Ordinance, Title 5, Chapter 5.74 of the Pasadena Municipal Code; and the Tobacco Use Prevention Ordinance, Title 8, Chapter 8.78 of the Pasadena Municipal Code

Dear Pasadena City Council Members:

The OUT Against Big Tobacco Coalition supports restricting the sale of **all** flavored tobacco products, without exemption, to protect our communities. We are an alliance of LGBTQ individuals, allies, and community organizations collectively working to address tobacco control and health inequity issues within our local LGBTQ+ community.

Our coalition strongly supports this ordinance, which would restrict the sale of all flavored tobacco products with no exemptions in the City of Pasadena. You have the opportunity to go further than the state legislature did with SB793 and include ALL flavored tobacco products in this ordinance, including hookah and premium cigars. We urge the Council to advance this ordinance to a second reading without the addition of exemptions.

When Congress passed the 2009 Tobacco Control Act, they restricted the sale of all flavored cigarettes except for menthol. Menthol being the flavor that is used most heavily within communities of color and by 70% of LGBTQ+ young people. This flavor is known to increase addiction to tobacco and increase the harms from the use of tobacco products. Yet, the federal government didn't think our community deserved equal protection from the tobacco industry.

In 2020, California attempted to correct this federal oversight and passed a bill to restrict the sale of flavored tobacco products. But Big Tobacco stepped in to protect their profits over the health of the people. This 2-year delay will make them a *billion* dollars in Menthol cigarette sales alone! We deserve better. Our lives should not be traded for a profit margin.

Restricting the sale of flavored tobacco ensures that tobacco users who want to quit are set up for success. Flavors not only mask the harsh taste and feel of a tobacco product, but they also increase nicotine addiction. Removing them from the shelves adds an additional barrier to non-tobacco users by no longer allowing Big Tobacco to hide their dangerous products behind pleasant tastes and smells.

The LGBTQ+ community is up to 4x more likely to use tobacco products compared to those who don't identify as LGBTQ+. Estimates of smoking rates among LGBTQ+ young people range from 38% to 59%, compared to just 28% to 35% of youth generally. Research from

**OUT Against Big Tobacco Coalition**

Eddie Martinez  
*Coalition Chair*

**Member Organizations:**

AMAAD Institute  
American Lung Association  
APAIT  
Gender Justice LA  
Health Access  
Invisible Men  
Latino Equality Alliance  
Los Angeles LGBT Center  
LA Gay & Lesbian Chamber of Commerce  
NAPAFASA  
Pueblo Y Salud  
Rescue Agency  
San Fernando Valley Partnership  
San Gabriel Valley LGBTQ Center  
Thirdhand Smoke Resource Center  
Trans Can Work  
VMA Enterprises, Inc.  
Youth Leadership Institute

**Members at Large:**

Zul Surani  
*Cedars-Sinai Cancer Institute*  
Ian Holloway, PhD  
*UCLA Luskin School of Public Affairs*  
Michael Browning  
*Community Member*

**Staff:**

Shannon Kozlovich, PhD  
Ryan Oda  
Kaitlyn Hodge  
*Equality California*

Los Angeles County indicates that up to 38% of our local LGBT community are tobacco users, including up to 80% of transgender women.

Tobacco advertisements leverage LGBTQ+ values (e.g., pride, freedom, acceptance) and cultural elements (e.g., rainbow flag, same sex couples, drag queens, etc.) to appeal to LGBTQ+ people and make us feel like using tobacco is a key part of our LGBTQ+ identity. Big Tobacco funds AIDS and LGBTQ+ nonprofit organizations and sponsors pride celebrations and events at gay bars to portray themselves as “friends” of our community — even as they harm our health and undermine our progress.

These messages, in combination with tactics that appeal to younger members of the LGBTQ+ community like promotions in bars and clubs, have placed LGBTQ+ youth and young adults at higher risk than their non-LGBTQ+ counterparts. In fact, understanding this trend led the FDA to develop *This Free Life*, the first national LGBTQ+ tobacco prevention campaign to educate LGBTQ+ young adults about living a tobacco-free life. Restricting the sale of all flavors in all tobacco products will protect upcoming generations of LGBTQ+ people by removing the products from the market that hook them in the first place.

In our local area El Monte, and the County of Los Angeles have already passed city/countywide restrictions on the sale of all flavored tobacco products, including Menthol and Hookah. The OUT Against Big Tobacco Coalition encourages Pasadena to protect the local community in ways that the FDA has refused to, and California was unable to by restricting the sale of **all** flavors in **all** tobacco products. Policies that prohibit the sale of flavored tobacco products, without exemption, offer the strongest protection for our youth and our communities from a lifetime of addiction and a preventable premature death.

Sincerely,

A handwritten signature in black ink that reads "Eddie Martinez". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

Eddie Martinez  
Coalition Chair  
OUT Against Big Tobacco Los Angeles

#### **OUT Against Big Tobacco**

OUT Against Big Tobacco, staffed by Equality California Institute, is an alliance of LGBTQ+ individuals, allies and community organizations collectively working to address tobacco control and health inequity issues within Los Angeles County's LGBTQ+ community. We advocate for common sense policies that protect LGBTQ+ people — especially the most vulnerable members of our community — from Big Tobacco's predatory marketing tactics.



## Martinez, Ruben

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**From:** Rodriguez, Yaneth <  
**Sent:** Monday, October 25, 2021 4:18 PM  
**To:** PublicComment-AutoResponse  
**Cc:** Lourdes Baez Conde; Jessica L. Barrington-Trimis; 'ylr@usc.edu'  
**Subject:** Ordinance Amending The Tobacco Retailer License Ordinance (Agenda item #11)  
**Attachments:** USC Flavor and E-cigarette \_Info Sheet\_ 05.22.19 (PDF).pdf; Tobacco Retail Licensing and Youth Product Use.pdf; 1.Examining Hookah as an Introduction to Nicotine Products among College Students (9.21.2021); Measurement and predictive value of susceptibility to cigarettes ecigarettes cigars and hookah among Texas adolescents.pdf

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**From:** Rodriguez, Yaneth  
**Sent:** Friday, October 22, 2021 1:34 PM  
**To:** VGordo@cityofpasadena.net; Awilson@cityofpasadena.net; Smadison@cityofpasadena.net; Jrivas@cityofpasadena.net; Gmasuda@cityofpasadena.net; Jkennedy@cityofpasadena.net; FWilliams@cityofpasadena.net; thampton@cityofpasadena.net  
**Cc:** Baezconde-Garbanati, Lourdes <baezcond@usc.edu>; Jessica Barrington-Trimis (jtrimis@usc.edu) <jtrimis@usc.edu>  
**Subject:** Ordinance Amending The Tobacco Retailer License Ordinance (Agenda item #11)

Dear Mayor, Vice Mayor & City Council Members of the City of Pasadena,

We are aware you are considering an ordinance to amend your tobacco retail license, that include prohibiting the sale of flavored tobacco products. As you consider the health of the community, in particular during this unprecedented time with COVID-19, you are also thinking of the health of future generations. Attached is an information sheet which contains research findings from the University of Southern California's Tobacco Center of Regulatory Science (USC TCORS). I hope this information is useful in your consideration of this ordinance.

A main research point I would like to highlight is that a **strong comprehensive tobacco retail ordinance to regulate e-cigarettes, flavored, and menthol tobacco products has tremendous potential to substantially reduce youth-use of tobacco products including e-cigarettes**. A Southern California research study showed that a strong tobacco retail license and enforcement preventing sales to minors was associated with lower rates of youth and adult initiation of combustible and e-cigarette use. A comprehensive ban on the sale of flavored tobacco products would include traditional combustible menthol cigarettes, as well as flavored chewing tobacco and flavored hookah.

I have also attached to this email additional information for your consideration regarding hookah. For each of the data points below, I have included a copy of the PDF article with important data points highlighted.

Hookah considerations:

- Hispanic/Latinx adolescents are more susceptible to hookah and 44% more likely reported current hookah use.
- One out of four college nicotine users started with hookah.

Current research suggests that it is important to consider the overall impact of e-cigarette and tobacco use on all segments of the population; however, the weight of the evidence points to a far more detrimental effect on youth.

We hope that this research can educate and inform your decisions. Please let me know if you have any questions our team may be able to answer.



Thank you, Yaneth

**Examining Hookah as an Introduction to Nicotine Products among College Students, Subst Use Misuse. 2018 Sep 19;53(11):1869-1877. doi: 10.1080/10826084.2018.1441308. PMID: 29533684:**

- One out of four nicotine users started with hookah, pg 1869, 1870, 1872, 1874
- Hookah use is second to cigarette smoking as the first tobacco product used, pg 1869-1870, 1872
- Hispanic/Latinx adolescents 44% more likely reported current hookah use. Pg 1873

**Measurement and predictive value of susceptibility to cigarettes ecigarettes cigars and hookah among Texas adolescents, Addict Behav Rep. 2018 Aug 18;8:95-101. doi: 10.1016/j.abrep.2018.08.005. PMID: 30140729 Free PMC article.:**

- Hispanic/Latinx adolescents are more susceptible to hookah, pg 96

Yaneth L. Rodriguez, MPH  
Center for Health Equity in the Americas  
Department of Population and Public Health Sciences  
Keck School of Medicine of USC  
University of Southern California

Office 302N; MC 9239  
Los Angeles, CA 90032

Since e-cigarettes have come to the Southern California market, the University of Southern California's expert faculty and research staff at the Keck School of Medicine have focused on exploring the potential impacts of e-cigarettes and flavored tobacco products on the general population as well as vulnerable populations, such as adolescents and young adults.

### **E-cigarettes are drawing in new youth smokers who would have otherwise been unlikely to smoke combustible cigarettes.**

- Two studies examining trends in tobacco use over time have shown that youth with no history of cigarette use and who are otherwise unlikely to have smoked combustible cigarettes are initiating e-cigarettes (1, 2).
- Cartoon images and non-traditional flavors and unique flavor names are appealing to youth and increase youth interest in e-cigarettes; most youth report initiation and continued use with flavored e-cigarettes (3-7).\*
- A study from Southern California youth reported that the most common reason for use of e-cigarettes are the availability of e-cigarettes in a wide variety of flavors (i.e. fruit, dessert, mint, etc.) (7, 8).
- E-cigarette companies actively market and re-post flavor-related information on social media at a much higher rate than non-flavor related posts (9).
- The availability of flavored e-cigarettes has been tied not only to initiation but also to continued use among youth, and a majority of youth reported that they would no longer use e-cigarettes if flavors were not available (6, 11).†
- JUUL and other low profile products that resemble computer flash drives thwart efforts to enforce smoking policy by providing easy concealment from authorities (3).
- A content analysis of customer reviews of 103 vape shops revealed that the most important attribute of a shop was related to their flavor selection (10).
- 17.3% of California high school students reported being a current user of an electronic vapor product, versus 13.2% national (12). †

### **There are clear health-related consequences of e-cigarette use among youth.**

- Youth who use e-cigarettes are 3 times as likely as those who have never used e-cigarettes to begin smoking combustible cigarettes (13-19)\*.
- Youth who use e-cigarettes and subsequently begin smoking cigarettes follow a similar trajectory into more frequent cigarette smoking as their peers who began smoking cigarettes without using e-cigarettes first (1, 2).
- A study among Southern California Hispanic young adults reported that using e-cigarettes increased the likelihood of transitioning from a non-user to user of cigarettes or marijuana and was not associated with smoking cessation (38).
- Level of nicotine in e-cigarettes has been associated with higher frequency of subsequent cigarette smoking (36).
- Exposure to nicotine in e-cigarettes is addictive (14-19)\*.
- E-cigarettes can have adverse respiratory effects (20)\*.
- E-liquids contain many harmful chemicals (i.e. acetals, formaldehyde, cinnamaldehyde, diacetyl, benzaldehyde, etc.) that are used to create the wide variety of flavors (21, 22). †

**There is inconsistent evidence regarding the use of e-cigarette as a cessation tool among youth, young adult, and adult smokers.**

- Studies have shown that many cigarette smokers, after using e-cigarettes, are likely to remain cigarette smokers rather than transitioning to e-cigarettes or quitting smoking (19, 23-25)\*.
- More recently, a single clinical trial has shown that regular e-cigarette use alongside counseling services increased cessation relative to other cessation products among participants in England; similar findings have not been observed in the US to date (37).<sup>†</sup>

**Menthol products makes smoking cessation more difficult and are disproportionately marketed to vulnerable populations such as ethnic minorities.**

- Among adult smokers in California, 18% of white cigarette smokers smoke menthol cigarettes where as 70% of African American cigarette smokers use menthol. Additionally, almost 50% of LGB smokers use menthol cigarettes compared to 28% of straight smokers (31).<sup>†</sup>
- Among Hispanic/Latino current adult smokers in the US, 46% smoke menthol cigarettes (27).<sup>†</sup>
- Among Hispanic/Latino young adult current smokers (aged 18-25) in the US from 2008 to 2010, 47.3% smoked menthol cigarettes (28).<sup>†</sup>
- Between 2008-2010 and 2012-2014, the largest increase in menthol cigarette use among race/ethnic groups was in found in Hispanic smokers (rising 9.8 percentage points) (29).<sup>†</sup>
- The use of flavored products, such as menthol cigarettes, makes cessation more difficult (26).<sup>†</sup>
- Studies have displayed negative associations among menthol cigarette use and successful cessation in Hispanic communities (30).<sup>†</sup>
- Approximately 90% of all cigarettes have menthol in them regardless of if they are advertised as menthol cigarettes or not (34).<sup>†</sup>

**Implementing enforceable regulations can prevent youth initiation of e-cigarettes and other tobacco products.**

- In Southern California, strong enforcement preventing sales to minors was associated with lower rates of youth and adult initiation of combustible and e-cigarette use (35). Communities that had tobacco retail licenses with sufficient fees to conduct enforcement efforts (e.g., sting operations) had lower rates of youth cigarette and e-cigarette use.
- A retail license ordinance to regulate e-cigarettes, flavored, and menthol tobacco products in Los Angeles County has tremendous potential to substantially reduce youth-use of tobacco products including e-cigarettes (35).
- The availability of e-cigarettes in flavors, and current location of retailers in close proximity to areas where youth congregate increases use of these products among young people (35); policies to reduce availability of these products across the community will likely have a substantial impact on youth use of tobacco products.

Current research suggests that it is important to consider the overall impact of e-cigarettes on all segments of the population; however, the weight of the evidence points to a far more detrimental effect on youth. We hope that this research can educate and inform future decision-makers.

For additional information, contact Yaneth Rodriguez at [ylr@usc.edu](mailto:ylr@usc.edu)



### References

- Barrington-Trimis JL, Urman R, Leventhal AM, Gauderman WJ, Cruz TB, Gilreath TD, et al. E-cigarettes, cigarettes, and the prevalence of adolescent tobacco use. *Pediatrics*. 2016;138(2).
- Leventhal AM, Strong DR, Sussman S, Kirkpatrick MG, Unger JB, Barrington-Trimis JL, et al. Psychiatric comorbidity in adolescent electronic and conventional cigarette use. *Journal of psychiatric research*. 2016;73:71-8.
- Barrington-Trimis JL, Leventhal AM. Adolescents' use of "Pod Mod" e-cigarettes—urgent concerns. *New England Journal of Medicine*. 2018;379(12):1099-102.
- Jackler RK, Ramamurthi D. Unicorns cartoons: marketing sweet and creamy e-juice to youth. *Tobacco control*. 2017;26(4):471-5.
- Kong G, Morean ME, Cavallo DA, Camenga DR, Krishnan-Sarin S. Reasons for electronic cigarette experimentation and discontinuation among adolescents and young adults. *Nicotine & tobacco research*. 2014;17(7):847-54.
- Bold KW, Kong G, Cavallo DA, Camenga DR, Krishnan-Sarin S. Reasons for trying e-cigarettes and risk of continued use. *Pediatrics*. 2016;138(3).
- Goldenson NI, Kirkpatrick MG, Barrington-Trimis JL, Pang RD, McBeth JF, Pentz MA, et al. Effects of sweet flavorings and nicotine on the appeal and sensory properties of e-cigarettes among young adult vapers: Application of a novel methodology. *Drug and alcohol dependence*. 2016;168:176-80.
- Hong H, McConnell R, Liu F, Urman R, Barrington-Trimis JL. The impact of local regulation on reasons for electronic cigarette use among Southern California young adults. *Addictive behaviors*. 2019;91:253-8.
- Chu K-H, Unger JB, Cruz TB, Soto DW. Electronic cigarettes on twitter—spreading the appeal of flavors. *Tobacco regulatory science*. 2015;1(1):36-41.
- Sussman S, Garcia R, Cruz TB, Baezconde-Garbanati L, Pentz MA, Unger JB. Consumers' perceptions of vape shops in Southern California: an analysis of online Yelp reviews. *Tobacco induced diseases*. 2014;12(1):22.
- Harrell M, Weaver S, Loukas A, Creamer M, Marti C, Jackson C, et al. Flavored e-cigarette use: Characterizing youth, young adult, and adult users. *Preventive medicine reports*. 2017;5:33-40.
- <https://nccd.cdc.gov/youthonline/App/Results.aspx?TT=G&OUT=0&SID=HS&QID=QQ&LID=CA&YID=2017&LID2=XX&YID2=2017&COL=T&ROW1=N&ROW2=N&HT=QQ&LCT=LL&FS=S1&FR=R1&FG=G1&FSL=S1&FRL=R1&FGL=G1&PV=&TST=True&C1=CA2017&C2=XX2017&QP=G&DP=1&VA=CI&CS=N&SYID=&EYID=&SC=DEFAULT&SO=ASC&PF=1>
- Soneji S, Barrington-Trimis JL, Wills TA, Leventhal AM, Unger JB, Gibson LA, et al. Association between initial use of e-cigarettes and subsequent cigarette smoking among adolescents and young adults: a systematic review and meta-analysis. *JAMA pediatrics*. 2017;171(8):788-97.
- Barrington-Trimis JL, Urman R, Berhane K, Unger JB, Cruz TB, Pentz MA, et al. E-cigarettes and future cigarette use. *Pediatrics*. 2016;138(1).
- Leventhal AM, Stone MD, Andrabi N, Barrington-Trimis J, Strong DR, Sussman S, et al. Association of e-cigarette vaping and progression to heavier patterns of cigarette smoking. *Jama*. 2016;316(18):1918-20.
- Unger JB, Soto DW, Leventhal A. E-cigarette use and subsequent cigarette and marijuana use among Hispanic young adults. *Drug and alcohol dependence*. 2016;163:261-4.
- Leventhal AM, Strong DR, Kirkpatrick MG, Unger JB, Sussman S, Riggs NR, et al. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *Jama*. 2015;314(7):700-7.
- Miech R, Patrick ME, O'malley PM, Johnston LD. E-cigarette use as a predictor of cigarette smoking: results from a 1-year follow-up of a national sample of 12th grade students. *Tobacco control*. 2017;26(e2):e106-e11.
- Barrington-Trimis JL, Kong G, Leventhal AM, Liu F, Mayer M, Cruz TB, et al. E-cigarette Use and Subsequent Smoking Frequency Among Adolescents. *Pediatrics*. 2018;142(6).
- McConnell R, Barrington-Trimis JL, Wang K, Urman R, Hong H, Unger J, et al. Electronic cigarette use and respiratory symptoms in adolescents. *American journal of respiratory and critical care medicine*. 2017;195(8):1043-9.
- Hanno C Erythropel, Sairam V Jabba, Tamara M DeWinter, Melissa Mendizabal, Paul T Anastas, Sven E Jordt, Julie B Zimmerman. **Formation of flavorant–propylene Glycol Adducts With Novel Toxicological Properties in Chemically Unstable E-Cigarette Liquids.** *Nicotine & Tobacco Research*, 2018; DOI: [10.1093/ntr/nty192](https://doi.org/10.1093/ntr/nty192)
- Tierney PA, Karpinski CD, Brown JE, et al. Flavour chemicals in electronic cigarette fluids. *Tobacco Control*. 2016;25: e10–e15.
- McRobbie H, Bullen C, Hartmann-Boyce J, Hajek P. Electronic cigarettes for smoking cessation and reduction. *Cochrane Database of systematic reviews*. 2014(12).
- Hajek P, Phillips-Waller A, Przulj D, Pesola F, Myers Smith K, Bisal N, et al. A randomized trial of e-cigarettes versus nicotine-replacement therapy. *New England Journal of Medicine*. 2019;380(7):629-37.
- Kalkhoran S, Glantz SA. E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis. *The Lancet Respiratory Medicine*. 2016;4(2):116-28.
- <https://www.changelabsolutions.org/publications/california-comprehensive-tobacco-retailer-licensing>
- <https://www.fda.gov/tobaccoproducts/labeling/productsingredientscomponents/ucm2019416.htm>
- <https://truthinitiative.org/news/tobacco-social-justice-issue-racial-and-ethnic-minorities>
- Villanti AC, Mowery PD, Delnevo CD, et al Changes in the prevalence and correlates of menthol cigarette use in the USA, 2004–2014 *Tobacco Control* 2016;25:ii14–ii20.
- Keeler, C., Max, W., Yerger, V., Yao, T., Ong, M. K., & Sung, H. Y. (2016). The Association of Menthol Cigarette Use With Quit Attempts, Successful Cessation, and Intention to Quit Across Racial/Ethnic Groups in the United States. *Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco*, 19(12), 1450–1464. doi:10.1093/ntr/ntw215
- Behavioral Risk Factor Surveillance System 2013–2015*. Sacramento, CA: California Department of Public Health.
- Yerger V.B. and R.E. Malone, *African American leadership groups: smoking with the enemy*. *Tobacco Control*, 2002. 11(4): p. 336-345.
- Myron Levin, Lorillard, other tobacco companies use politics to protect menthol brands, in *Fairwarning*. November 18, 2015, News and Record: Greensboro, North Carolina.
- Wickham, R., *Focus: Addiction: How Menthol Alters Tobacco- Smoking Behavior: A Biological Perspective*. *The Yale Journal of Biology and Medicine*, 2015. 88(3): p. 279.
- Astor RL, Urman R, Barrington-Trimis JL, Berhane K, Steinberg J, Cousineau M, et al. Tobacco Retail Licensing and Youth Product Use. *Pediatrics*. 2019;143(2):e20173536.
- Goldenson, N. I., Leventhal, A. M., Stone, M. D., McConnell, R. S., & Barrington-Trimis, J. L. (2017). Associations of electronic cigarette nicotine concentration with subsequent cigarette smoking and vaping levels in adolescents. *JAMA pediatrics*, 171(12), 1192-1199.
- Rigotti, N. A., Chang, Y., Tindle, H. A., Kalkhoran, S. M., Levy, D. E., Regan, S., ... & Singer, D. E. (2018). Association of E-Cigarette Use With Smoking Cessation Among Smokers Who Plan to Quit After a Hospitalization. *Annals of internal medicine*, 168(9), 613-620.
- Unger, J. B., Soto, D. W., & Leventhal, A. (2016). E-cigarette use and subsequent cigarette and marijuana use among Hispanic young adults. *Drug and alcohol dependence*, 163, 261-264.



# Tobacco Retail Licensing and Youth Product Use

Roe L. Astor, MPH,<sup>a</sup> Robert Urman, PhD,<sup>a</sup> Jessica L. Barrington-Trimis, PhD,<sup>a</sup> Kiros Berhane, PhD,<sup>a</sup> Jane Steinberg, PhD,<sup>a</sup> Michael Cousineau, PhD,<sup>a</sup> Adam M. Leventhal, PhD,<sup>a</sup> Jennifer B. Unger, PhD,<sup>a</sup> Tess Cruz, PhD,<sup>a</sup> Mary Ann Pentz, PhD,<sup>a</sup> Jonathan M. Samet, MD, MS,<sup>b</sup> Rob McConnell, MD<sup>a</sup>

**BACKGROUND:** Restricting youth access to tobacco is a central feature of US tobacco regulatory policy, but impact of local tobacco retail licensing (TRL) regulation on cigarette smoking rates remains uncertain. Effects of TRL on other tobacco product use and use as adolescents reach the age to legally purchase tobacco products has not been investigated.

**METHODS:** Prevalences of ever and past 30-day cigarette, electronic cigarette (e-cigarette), cigar, and hookah use were assessed in a survey of a cohort of 1553 11th- and 12th-grade adolescents (mean age: 17.3 years); rates of initiation were evaluated 1.5 years later. An American Lung Association (2014) youth access grade was assigned to each of 14 political jurisdictions in which participants lived on the basis of the strength of the local TRL ordinance.

**RESULTS:** At baseline, participants living in 4 jurisdictions with “A” grades (ie, with most restrictive ordinances) had lower odds of ever cigarette use (odds ratio [OR] 0.61; 95% confidence interval [CI] 0.41–0.90) and of past 30-day use (OR 0.51; 95% CI 0.29–0.89) than participants in 10 D- to F-grade jurisdictions. At follow-up at legal age of purchase, lower odds of cigarette use initiation (OR 0.67; 95% CI 0.45–0.99) occurred in jurisdictions with stronger TRL policy. Lower odds of e-cigarette initiation at follow-up (OR 0.74; 95% CI 0.55–0.99) and of initiation with past 30-day use (OR 0.45; 95% CI 0.23–0.90) were also associated with better regulation.

**CONCLUSIONS:** Strong local TRL ordinance may lower rates of cigarette and e-cigarette use among youth and young adults.



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Dr McConnell conceptualized and designed the study and reviewed and revised the manuscript; Mr Astor collected data on tobacco retail licensing in study communities, conducted a literature review, and drafted the manuscript; Dr Urman conducted all data analyses; Drs Barrington-Trimis, Berhane, Steinberg, Cousineau, Leventhal, Unger, Cruz, Pentz, and Samet provided advice on the analysis and interpretation of results and reviewed and provided guidance on the development of the manuscript; and all authors approved the final manuscript as submitted.

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**WHAT'S KNOWN ON THIS SUBJECT:** Restricting youth access to tobacco has long been a central feature of US tobacco regulatory policy, but the impact of local tobacco retail licensing regulation on electronic cigarette use rates remains uncertain.

**WHAT THIS STUDY ADDS:** Strong local tobacco retail licensing ordinances may lower rates of cigarette and electronic cigarette use among youth and young adults. Success of regulations restricting youth access to cigarettes and alternative tobacco products may depend on ensuring a robust enforcement scheme.

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Most US states have had laws to restrict the sale of cigarettes to minors for decades.<sup>1</sup> Because there was widespread violation of these laws by tobacco vendors,<sup>2</sup> Congress passed the Synar Amendment to the Public Health Service Act in 1993,<sup>3</sup> which required that states enact laws banning cigarette sales to minors and that they enforce such laws with compliance checks using undercover “decoys” posing as underage customers.<sup>4,5</sup>

Enforcement of these youth access regulations is a central feature of US tobacco control programs. However, although compliance checks of vendors have been shown to reduce sales to minors, their effectiveness in reducing youth smoking rates is less certain, for example, because they may obtain cigarettes legally purchased by older friends.<sup>6,7</sup> Key regulatory features that are reported to reduce both compliance violations and youth cigarette use include a mandatory tobacco retailer licensing fee to provide sustainable funding of undercover decoys to make at least 1 annual visit to each vendor and fines or penalties for violations.<sup>7,8</sup> Low rates of vendor compliance checks, which occur annually at only a small fraction of tobacco vendors under existing state and federal enforcement programs,<sup>9,10</sup> and inadequate penalties may explain why associations with youth smoking rates have not consistently been observed.<sup>7</sup> Within states, compliance enforcement may vary markedly on the basis of local ordinances that provide funding to do so. Given the expense involved in enforcement and the lack of expert consensus on its benefits, additional studies are warranted to assess the effectiveness in reducing youth cigarette use.

The impact of youth access restriction on the initiation of alternative tobacco products, such as electronic cigarettes (e-cigarettes), hookah, and cigars, has not been studied, although prevalence of ever

using these products is high.<sup>11</sup> An additional gap in understanding the effectiveness of youth tobacco access restriction is during the transition to the legal age of purchase. Most adult smokers historically have initiated cigarette use by age 18,<sup>12</sup> which is the legal age of purchase in most states. There have been few prospective studies examining the effect of tobacco licensing and youth access restriction on cigarette and alternative tobacco product use during this transition to adult life.

Among participants in the Southern California Children’s Health Study, we evaluated whether youth living in jurisdictions with a strong tobacco retail licensing (TRL) ordinance had reduced prevalence of cigarette and other tobacco use, compared with participants in jurisdictions with a poor TRL ordinance. In addition, using prospectively collected data, we assessed the association of local ordinances with the initiation of tobacco product use during a cohort follow-up as youth reached 18 years of age, the age at which the sale of tobacco products was legal in California at the time of the study.

## METHODS

### Study Population

Between January and June of 2014, a total of 2097 11th- and 12th-grade participants in the Southern California Children’s Health Study (mean age: 17.3; SD: 0.6) completed self-administered questionnaires collecting detailed information about cigarette and alternative tobacco product use. Follow-up online questionnaire data were collected on 1553 participants (74% of the 2097 at baseline) as they reached 18 years of age, between January 2015 and June 2016 (mean age: 18.8; SD: 0.6). Additional characteristics of the study sample have been described previously.<sup>13,14</sup>

### Ethics Statement

The study was approved by the University of Southern California Institutional Review Board. Parental written informed consent and child assent were obtained for all Children’s Health Study participants <18 years of age. Participants age 18 or older provided written informed consent.

### Tobacco and Alternative Tobacco Product Use

At each survey, participants were asked whether they had ever tried e-cigarettes, cigarettes, cigars, or hookah and the number of days each product was used in the past 30 days.<sup>12</sup> Participants who had “never tried” a product (not “even 1 or 2 puffs”) were classified as never users. Those reporting an age at first use of each tobacco product were classified as ever (lifetime prevalent) users of that product at baseline. Rates of initiation were calculated on the basis of a new report of use of a tobacco product at follow-up among participants not reporting use of that product at baseline. Both prevalent users and initiators of each tobacco product were further characterized on the basis of past 30-day use.

### Evaluation of Local Tobacco Regulatory Licensing to Reduce Youth Access

There were 14 political jurisdictions with corresponding tobacco product ordinances across the 12 participating Children’s Health Study communities. Four study jurisdictions were assigned an A grade on the basis of the 2014 American Lung Association (ALA) “Reducing Sales of Tobacco Products” to youth scale, which is used to evaluate the strength of the local TRL ordinance across California.<sup>15</sup> An A grade required adequate annual retail license fees, which were paid by all tobacco retailers (including gas stations, convenience stores, larger grocery stores, and pharmacies),



to cover the administration of an enforcement program and regular compliance checks in each store. An A grade also required (1) an annual renewal of this local license; (2) a provision that any violation of local, state, or federal law is a violation of the license; and (3) a graduated penalty system for violators, including financial deterrents such as fines or other penalties, including license revocation or suspension.<sup>15</sup>

The remaining study jurisdictions were assigned an F grade (8) or a D grade (1). An F grade indicated either (1) no local ordinance mandating a license fee or (2) a fee insufficient to fund administrative and compliance checks as well as none of the 3 other provisions for an A grade. The jurisdiction with the D grade had a licensing fee that was insufficient to cover administration and compliance checks, but it had at least 1 of the other 3 provisions listed above that were needed for an A grade. The D and F communities were collapsed for data analysis, because the insufficient annual fee is a central feature of regulation to reduce youth access.<sup>7,15</sup> No study jurisdiction in this sample had B or C grades corresponding to TRL policies of intermediate quality.<sup>15</sup>

ALA assigned grades to other categories of tobacco policy (smoke-free housing policy, smoke-free outdoor policy, and overall tobacco policy).<sup>15</sup> These policies, which are not specific to youth tobacco product access, were not associated with tobacco product use in this study, and results are not presented.

### Covariates

Self-administered questionnaires completed by parents of participants were used to assess sociodemographic characteristics, including sex, ethnicity (Hispanic, non-Hispanic white, other), age at baseline, and parental education (completed high school or less, some

college, or completed college or more).

### Statistical Analysis

Unconditional logistic regression models were used to evaluate the associations of living in a jurisdiction with an ALA grade A versus D or F TRL ordinance with baseline ever and past 30-day use of cigarettes, e-cigarettes, hookah, cigars, or use of any of these tobacco products in separate models. Models were also fit to evaluate associations of ALA grade with the initiation of each product, with or without past 30-day use. In models used to evaluate the initiation of use of each tobacco product between baseline and follow-up, the sample was restricted to baseline never users of that product. Odds ratios (ORs) and 95% confidence intervals (CIs) were used to estimate the association of each tobacco product use with an ALA grade. All models were adjusted for sex, ethnicity, highest parental education, and baseline age, factors that have been associated both with e-cigarette use and cigarette use in previous studies.<sup>13,14</sup> Each tobacco product-specific model was also adjusted for a baseline history of use of any other tobacco product, because there was clustering of the tobacco product outcomes.<sup>13</sup> A missing indicator category for covariates and any other tobacco product use was included where appropriate. Additionally, all models included a random effect for community to account for similarities among subjects within jurisdictions. In a sensitivity analysis, models were further adjusted for time between baseline and follow-up questionnaire completion. Statistical analyses were based on 2-sided hypotheses tested at a 0.05 level of significance, using SAS 9.4 (SAS Institute, Inc, Cary, NC).

### RESULTS

Of the 2097 participants, 31.1% (652) lived in a jurisdiction with an

ALA 2014 TRL A grade, and 68.9% (1445) students lived in jurisdictions with D or F grades. Sex and ethnic distributions were similar in A and D or F jurisdictions, but students in A jurisdictions were more likely to come from less-educated households (Table 1). Unadjusted prevalence and initiation rates for each tobacco product were lower in jurisdictions with A than with D or F grades, with the exception of new initiation of hookah with past 30-day use. Initiation rates were substantial among never tobacco product users at baseline, in particular for e-cigarette use. Both prevalence and initiation rates of past 30-day tobacco product use generally did not exceed 10% for any product.

For baseline prevalence of ever and past 30-day use of cigarette and e-cigarette ever use, and to a lesser degree for prevalence of cigar use, jurisdictions with A grades had generally lower use rates than D or F jurisdictions (Supplemental Fig 3). However, within both grade groups, there was considerable variability in prevalence rates across jurisdictions for all tobacco products. Rates in individual jurisdictions had wide CIs (results not shown) because of small sample size. Rates of tobacco product initiation at follow-up were also generally quite variable across the jurisdictions within both A and D or F grades (Supplemental Fig 4).

At baseline, participants living in the 4 jurisdictions with A grades had lower odds of ever using a cigarette (OR 0.61; 95% CI 0.41–0.90) and of past 30-day use (OR 0.51; 95% CI 0.29–0.89) than participants in 10 D- to F-grade jurisdictions, after adjusting for sociodemographic covariates and other tobacco product use at baseline (Fig 1).

Living in A-grade jurisdictions was associated with lower odds of initiation of cigarette use between baseline and the follow-up questionnaire (OR 0.67; 95% CI 0.45–0.99 [Fig 2]). The risks of



**TABLE 1** Prevalence of Sociodemographic Characteristics, Lifetime, and Current (Last 30-Day) Use of Each Tobacco Product at Baseline and Rates of Product Initiation at Follow-up Among Youth Residing in a Jurisdiction With ALA Reduced Tobacco Sales, Grade A or D or F

	Grade A	Grade D or F
	N (%) <sup>a</sup>	N (%) <sup>a</sup>
Sex		
Male	324 (49.7)	735 (50.9)
Female	328 (50.3)	710 (49.1)
Ethnicity		
Hispanic white	349 (53.5)	736 (50.9)
Non-Hispanic white	230 (35.3)	504 (34.9)
Other	73 (11.2)	205 (14.2)
Parent education		
Less than or equal to high school	245 (41.3)	460 (34.3)
Some college	219 (36.9)	502 (37.4)
College or more	129 (21.8)	379 (28.3)
Prevalent ever tobacco product use at baseline		
Cigarette	89 (13.7)	302 (21.0)
E-cigarette	123 (19.0)	379 (26.4)
Hookah	158 (24.3)	411 (28.6)
Cigars	69 (10.6)	204 (14.2)
Any tobacco product	214 (32.9)	564 (39.2)
Prevalent past 30-d tobacco product use at baseline		
Cigarette	24 (3.7)	95 (6.6)
E-cigarette	56 (8.6)	145 (10.1)
Hookah	62 (9.5)	162 (11.3)
Cigars	21 (3.2)	55 (3.8)
Any tobacco product	107 (16.5)	267 (18.6)
Initiation of tobacco product use (between baseline and follow-up) <sup>b</sup>		
Cigarette	52 (13.1)	156 (18.0)
E-cigarette	92 (24.7)	235 (29.7)
Hookah	55 (15.9)	146 (18.9)
Cigars	49 (12.0)	158 (17.1)
Any tobacco product	85 (27.7)	198 (30)
Initiation with past 30-d tobacco product use at follow-up <sup>b</sup>		
Cigarette	17 (4.3)	52 (6.0)
E-cigarette	17 (4.7)	69 (8.9)
Hookah	16 (4.7)	32 (4.2)
Cigars	12 (2.9)	36 (3.9)
Any tobacco product	24 (7.9)	78 (12.1)

<sup>a</sup> The denominator (652 in grade A; 1445 in grade D or F) varies because of missing values in covariates.

<sup>b</sup> Restricted to nonusers of each product (or of any tobacco product) at baseline.

initiation of e-cigarettes (OR 0.74; 95% CI 0.55–0.99) and of initiation with past 30-day use (OR 0.45; 95% CI 0.23–0.90) were also lower in A-grade than D- or F-grade jurisdictions. In sensitivity analyses adjusting for time since turning 18 at follow-up, there was no change in the protective effect estimate of living in a well-regulated (A-grade) jurisdiction (results not shown). Participants still living in their jurisdiction of origin at follow-up evaluation would have had consistent exposure to the same regulatory environment. In this sample, there were stronger protective A-grade

compared with D- or F-grade associations with cigarette and e-cigarette initiation at follow-up (and of initiation of e-cigarettes with past 30-day use) than in the entire sample (results not shown). The protective association of A-grade residence with initiation of cigar use was similar in magnitude to the association with cigarette and e-cigarette use but was not statistically significant.

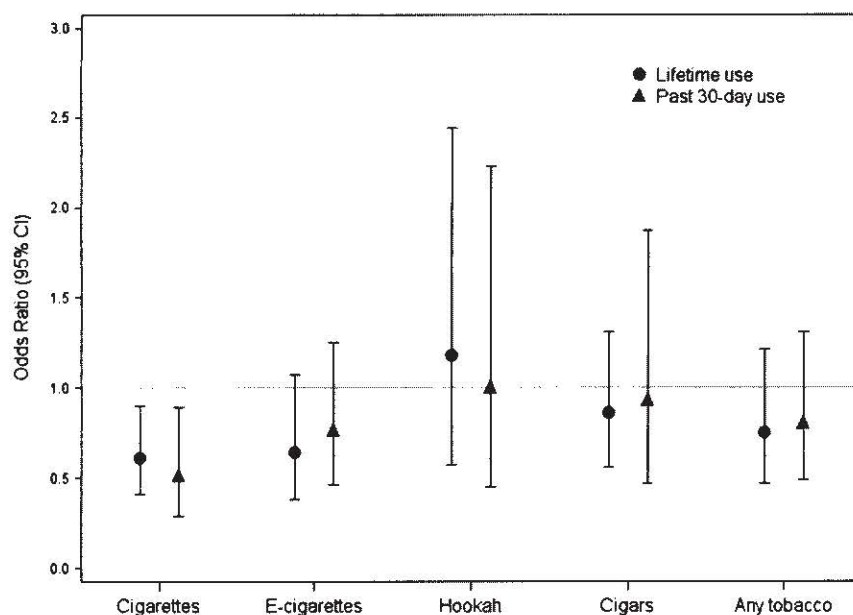
## DISCUSSION

Central features of the ALA TRL grade include a licensing fee

sufficient to fund compliance checks and enforcement of regulations prohibiting tobacco sales to minors and penalties for violating the law, features of TRL that have been reported to be necessary to reduce sales to and use by youth.<sup>7</sup> Compared with living in a jurisdiction with poor TRL policy, youth in a jurisdiction satisfying these criteria were less likely to smoke in high school. In a prospective follow-up of the cohort, the odds of initiation of e-cigarette use, with or without past 30-day use, and of initiation of cigarette use were also lower in well-regulated jurisdictions. Stronger associations among participants still living in their jurisdiction of origin at follow-up evaluation, with consistent exposure to the same regulatory environment throughout, also suggest that the benefits of good TRL policy extended both beyond cigarette use to e-cigarette use and into early adult life at age 18 when the sale of tobacco products was legal at the time of the study. The protective associations were large, with risk lower by one-third to a half in the strong compared with weak TRL jurisdictions (depending on the outcome).

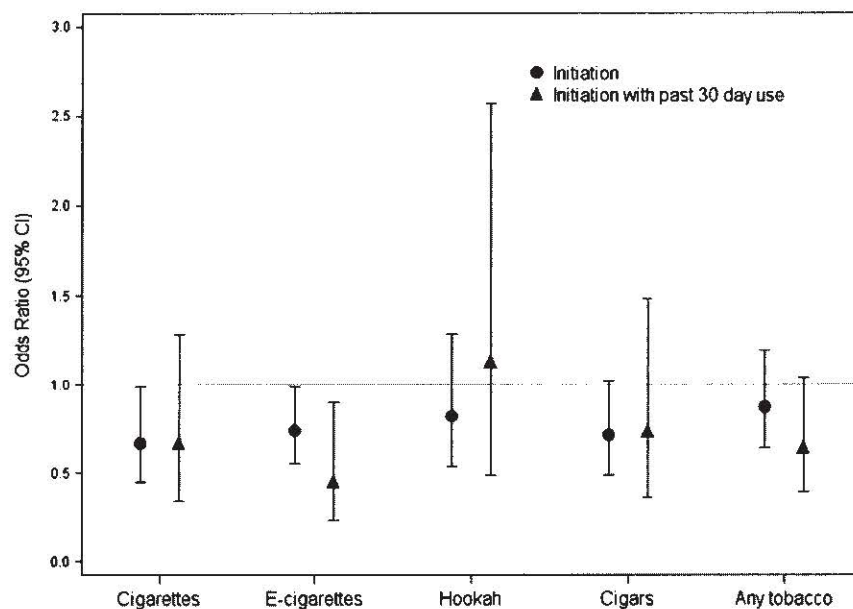
There has been uncertainty regarding the effects of youth access restrictions on cigarette use.<sup>6,7,16</sup> Some authors of prospective studies in which age-specific prevalence of tobacco use was assessed before and after regulatory intervention to restrict youth access found reductions in cigarette use,<sup>17–20</sup> but others found no benefit.<sup>21,22</sup> Authors of 1 review of studies that reported changes in smoking associated with youth access restrictions found no relationship of vendor compliance or of changes in vendor compliance, with smoking prevalence in a meta-analysis of available studies,<sup>6</sup> perhaps because the restriction of commercial access resulted in a shift to social sources of cigarettes such as older friends or siblings. Authors of other observational studies have





**FIGURE 1**

Associations of prevalent lifetime and current (last 30-day) use of each tobacco product at baseline with residence in ALA Reduced Tobacco Sales grade A jurisdictions, compared with residence in grade D or F jurisdictions. Models were adjusted for sex, ethnicity, parental education, age at baseline, and for any other tobacco product use at baseline (except for any tobacco product use prevalence, which was compared with never users of any tobacco product) and included a random effect for jurisdiction.



**FIGURE 2**

Associations of initiation of use of each tobacco product between baseline and follow-up and of initiation and current (last 30-day) use, with residence in ALA Reduced Tobacco Sales grade A jurisdictions, compared with residence in grade D or F jurisdictions. Each model was restricted to nonusers of product at baseline. Models were adjusted for sex, ethnicity, parental education, age at baseline, and for any other tobacco product use at baseline (except for any tobacco product use initiation, which was compared with never users of any tobacco product at either baseline or follow-up) and included a random effect for jurisdiction.

found reduced smoking rates in communities with youth access restrictions, but it was not clear that reduced access mediated the reduction in smoking rates.<sup>19,23</sup> For example, sustained reductions in adolescent daily smoking rates were observed in Minnesota communities that were randomly assigned to intervention supporting community organizers to develop and promote good TLR ordinances, compared with nonintervention communities.<sup>20</sup> However, it was not clear whether the observed reductions in smoking rates were due to youth access restrictions and improved vendor compliance or to other regulatory features resulting from the intervention, such as bans on vending machines and requirements for posted signs reporting age of sale policies, or for storing cigarettes behind the sales counter.<sup>17</sup>

Our results are broadly consistent with findings of a comprehensive review in which authors concluded that lower smoking rates occur if local TRL requires yearly compliance checks with effective enforcement.<sup>7</sup> Our study is 1 of the few that assessed associations of TRL with both prevalence and initiation rates in a prospective assessment of the same participants during an adolescent period of known high incidence of initiation. The prospective cohort design of the study also provided the opportunity to examine the impact of TRL on legal tobacco product use by young adults. The reduced risk of initiation of cigarette and e-cigarette use at follow-up in jurisdictions with better TRL regulation (with effect estimates that were unaffected by adjusting for time since turning 18 at follow-up) suggests that regulation may have lowered initiation rates even after participants reached the age for legal purchase. Although most adult smokers historically first use cigarettes before age 18,<sup>12</sup> in our cohort, rates of initiation of tobacco

product use were substantial, even in well-regulated jurisdictions. For example, in jurisdictions with an A grade, rates of initiation of cigarette and e-cigarette use during the follow-up period were 13.1% and 24.7%, respectively (from Table 1); these high rates of experimentation indicate a need for interventions to reduce initiation in this susceptible age window.

An alternative explanation for the protective effects of better TRL policy is that the associations reflected broadly unfavorable community attitudes toward cigarette use, including other tobacco regulations that affected the use of cigarettes and e-cigarettes to minors. If this were the explanation, we might expect to have seen associations with the other ALA tobacco grades relating to, for example, smoke-free housing, smoke-free outdoor air, or the overall tobacco grade in a jurisdiction. However, protective effects only of the TRL grade were observed.

Lower odds of cigar use initiation associated with better TRL regulation, although not statistically significant, were similar in magnitude to reductions in odds of the initiation of cigarettes and e-cigarettes. However, living in a jurisdiction with stronger regulation was not protective for baseline prevalence or subsequent initiation of hookah use. Sales of hookah paraphernalia often occur in specialty shops and hookah bars where cigarettes may not have been sold<sup>24</sup> and therefore may not consistently have been subjected to the same rigorous compliance checks as traditional cigarette vendors. E-cigarettes are commonly sold at locations that also sell cigarettes that would have been subject to TRL regulation, and a state law passed in 2010 made it illegal to sell e-cigarettes to minors.<sup>25</sup> However, e-cigarettes are also sold in specialty “vape” shops,<sup>26</sup> and at

the time of the study, e-cigarettes were not specifically categorized as a tobacco product.<sup>27</sup> Therefore, vape shops were not required by state law to obtain a tobacco vendor license if they were not selling other tobacco products. If strong TRL regulation was responsible for the lower rates of e-cigarette use in A-grade jurisdictions, it is possible that similar TRL requirements for vape shops would have resulted in larger protective effects.

The US Food and Drug Administration (FDA) has contracts with regulators in most states to restrict youth tobacco access and also conducts its own inspections and hires third parties to conduct compliance checks.<sup>28</sup> However, the frequency of compliance checks is generally low, because of resource limitations, and penalties for violation of the law vary widely between states. California, for example, which has been a leader in tobacco control, annually inspected, on average, only 7% of tobacco retailers in 2016.<sup>9,10</sup> If a high rate of compliance checks, accompanied by enforcement, is necessary to reduce youth smoking as our results suggest, then strong local TRL ordinances may be an important option to reduce teen tobacco product use through access restriction.<sup>10,29,30</sup>

The study has some limitations. The ALA criteria for an A grade covered a relatively broad spectrum of TRL policy relevant to youth access, including larger fees, compliance access, and penalties if vendors violated the law. Identifying the possible effects of specific features of the TRL policy was not possible. A minimum proportion of vendors actually undergoing compliance checks was not specified, and it was not possible to assess the effect of the proportion of vendors visited. In addition, the “deeming rule” that defined e-cigarettes and hookah as tobacco products means that TRL

will be required of all vendors of these products.<sup>31</sup> The recent increase in the legal age of tobacco product purchase to 21 years in California, passed after data collection for this study was completed, means that the associations of TRL policy with use during the transition to legal age of purchase may no longer be applicable to California. However, the results may broadly be generalizable to local jurisdictions in states with a legal purchase age of 18 years, with the exception of a few states that have prohibited local jurisdictions from enacting more stringent local regulation.<sup>32</sup> The increase of poorly regulated e-cigarette Internet vendors, a relatively new way for minors to obtain tobacco products illegally at the time of data collection, may limit the future impact of TRL as a regulatory tool.<sup>33</sup> Future follow-up of this cohort is warranted to determine the persistence of associations with strong youth TRL and to examine longitudinally potential mediating factors, such as social characteristics of neighborhoods and communities and individuals’ changing tobacco social environment over time. There were also other potential confounders or mediators of TRL effects, such as differences in school-level tobacco prevention programs or number of tobacco outlets by jurisdiction, that were not available to study.

## CONCLUSIONS

The results suggest that a strong local TRL ordinance that provides adequate resources to fund regular compliance checks and enforcement may result in large reductions in the use of cigarettes and may also result in reduced e-cigarette use. The benefits of these policies may extend into early adult life. The study also suggests that the success of future FDA regulation to reduce youth cigarette and alternative tobacco product access and use, under rules



deeming these products to be subject to FDA regulation,<sup>31</sup> may depend on the availability of resources for universal annual compliance checks and enforcement targeted to both traditional and alternative tobacco product vendors. Continued monitoring is needed to assess the impact on the effectiveness of TRL

policy within the rapidly evolving tobacco product patterns of use, new national regulation, and poorly regulated Internet sales.

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# ABBREVIATIONS

ALA: American Lung Association  
CI: confidence interval  
e-cigarette: electronic cigarette  
FDA: US Food and Drug Administration  
OR: odds ratio  
TRL: tobacco retail licensing

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# REFERENCES

- Centers for Disease Control (CDC). State laws restricting minors' access to tobacco. *MMWR Morb Mortal Wkly Rep*. 1990;39(21):349–353
- Preventing tobacco use among young people. A report of the surgeon general. Executive summary. *MMWR Recomm Rep*. 1994;43(RR-4):1–10
- United States Department of Health and Human Services. Substance abuse prevention and treatment block grants: sale or distribution of tobacco products to individuals under 18 years of age. *Fed Regist*. 1993;58(164):45156–45174
- United States Department of Health and Human Services Office of the Inspector General. State oversight of tobacco sales to minors. 1995. Available at: <https://oig.hhs.gov/oei/reports/oei-02-94-00270.pdf>. Accessed August 17, 2016
- Forster JL, Widome R, Bernat DH. Policy interventions and surveillance as strategies to prevent tobacco use in adolescents and young adults. *Am J Prev Med*. 2007;33(suppl 6):S335–S339
- Fichtenberg CM, Glantz SA. Youth access interventions do not affect youth smoking. *Pediatrics*. 2002;109(6):1088–1092
- DiFranza JR. Which interventions against the sale of tobacco to minors can be expected to reduce smoking? *Tob Control*. 2012;21(4):436–442
- Center for Tobacco Policy & Organizing; American Lung Association in California. Tobacco retailer licensing is effective. 2013. Available at: <http://center4tobaccopolicy.org/wp-content/uploads/2016/10/Tobacco-Retailer-Licensing-is-Effective-September-2013.pdf>. Accessed February 25, 2017
- California Department of Health Care Services. State of California; 42 U.S.C. 300x-26, OMB No 0930-0222. FFY 2017. Available at: [https://www.dhcs.ca.gov/provgovpart/Documents/Substance Use Disorder-PPFD/SYNAR\\_2017\\_Report.pdf](https://www.dhcs.ca.gov/provgovpart/Documents/Substance%20Use%20Disorder-PPFD/SYNAR_2017_Report.pdf). Accessed December 8, 2018
- American Lung Association in California; The Center for Tobacco Policy and Organizing. Becoming a policy wonk on local tobacco retailer licensing: answers to tough questions from opponents and elected officials. June 2018. Available at: <https://center4tobaccopolicy.org/wp-content/uploads/2018/06/Becoming-a-Policy-Wonk-on-TRL-2018-06-20.pdf>. Accessed December 8, 2018
- Singh T, Arrazola RA, Corey CG, et al. Tobacco use among middle and high school students—United States, 2011–2015. *MMWR Morb Mortal Wkly Rep*. 2016;65(14):361–367
- Alberg AJ, Shopland DR, Cummings KM. The 2014 surgeon general's report: commemorating the 50th anniversary of the 1964 report of the advisory committee to the US surgeon general and updating the evidence on the health consequences of cigarette smoking. *Am J Epidemiol*. 2014;179(4):403–412
- 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
- Barrington-Trimis JL, Urman R, Berhane K, et al. E-cigarettes and future cigarette use. *Pediatrics*. 2016;138(1):e20160379
- American Lung Association in California. State of tobacco control 2014 – California local grades. 2015. Available at: [http://tobaccocontrol.usc.edu/files/SOTC\\_2014\\_CA\\_REPORT\\_and\\_GRADES\\_3\\_7.pdf](http://tobaccocontrol.usc.edu/files/SOTC_2014_CA_REPORT_and_GRADES_3_7.pdf). Accessed August 11, 2017
- Etter JF. Laws prohibiting the sale of tobacco to minors: impact and adverse consequences. *Am J Prev Med*. 2006;31(1):47–51
- Forster JL, Murray DM, Wolfson M, Blaine TM, Wagenaar AC, Hennrikus DJ. The effects of community policies to reduce youth access to tobacco. *Am J Public Health*. 1998;88(8):1193–1198

18. Jason LA, Ji PY, Anes MD, Birkhead SH. Active enforcement of cigarette control laws in the prevention of cigarette sales to minors. *JAMA*. 1991;266(22):3159–3161
19. Cummings KM, Hyland A, Perla J, Giovino GA. Is the prevalence of youth smoking affected by efforts to increase retailer compliance with a minors' access law? *Nicotine Tob Res*. 2003;5(4):465–471
20. Chen V, Forster JL. The long-term effect of local policies to restrict retail sale of tobacco to youth. *Nicotine Tob Res*. 2006;8(3):371–377
21. Rigotti NA, DiFranza JR, Chang Y, Tisdale T, Kemp B, Singer DE. The effect of enforcing tobacco-sales laws on adolescents' access to tobacco and smoking behavior. *N Engl J Med*. 1997;337(15):1044–1051
22. Bagott M, Jordan C, Wright C, Jarvis S. How easy is it for young people to obtain cigarettes, and do test sales by trading standards have any effect? A survey of two schools in Gateshead. *Child Care Health Dev*. 1998;24(3):207–216
23. Siegel M, Biener L, Rigotti NA. The effect of local tobacco sales laws on adolescent smoking initiation. *Prev Med*. 1999;29(5):334–342
24. Cawkwell PB, Lee L, Weitzman M, Sherman SE. Tracking hookah bars in New York: utilizing yelp as a powerful public health tool. *JMIR Public Health Surveill*. 2015;1(2):e19
25. California Legislative Information. Electronic Cigarettes, California State Senate Bill 882. 2009-2010 regular session. (Ca 2010). 2010. Available at: [http://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=200920100SB882](http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=200920100SB882). Accessed February 25, 2017
26. Lee YO, Kim AE. 'Vape shops' and 'e-cigarette lounges' open across the USA to promote ENDS. *Tob Control*. 2015;24(4):410–412
27. Legislative Counsel's Digest. Amendment to the stop tobacco access to kids enforcement (STAKE) act, Assembly Bill 1301. 2011-2012 regular session. (Ca 2012). 2012. Available at: [www.leginfo.ca.gov/pub/11-12/bill/asm/ab\\_1301-1350/ab\\_1301\\_bill\\_20120618\\_amended\\_sen\\_v92.html](http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_1301-1350/ab_1301_bill_20120618_amended_sen_v92.html). Accessed February 25, 2017
28. US Food and Drug Administration. FDA tobacco retail inspection contracts. 2016. Available at: [www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation/Retail/ucm228914.htm](http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation/Retail/ucm228914.htm). Accessed January 10, 2016
29. U.S. Food and Drug Administration; Tobacco Control Legal Consortium. State and local tobacco regulation in a post-deeming world. 2016. Available at: <http://publichealthlawcenter.org/sites/default/files/resources/tclc-fda-deemingreg-state-and-local-regulation-2016.pdf>. Accessed February 13, 2017
30. McLaughlin I. License to kill?: tobacco retailer licensing as an effective enforcement tool. 2010. Available at: <http://publichealthlawcenter.org/sites/default/files/resources/tclc-syn-retailer-2010.pdf>. Accessed February 25, 2017
31. Food and Drug Administration, HHS. Deeming tobacco products to be subject to the federal food, drug, and cosmetic act, as amended by the family smoking prevention and tobacco control act; restrictions on the sale and distribution of tobacco products and required warning statements for tobacco products. Final rule. *Fed Regist*. 2016;81(90):28973–29106
32. Lempert LK, Grana R, Glantz SA. The importance of product definitions in US e-cigarette laws and regulations. *Tob Control*. 2016;25(e1):e44–e51
33. Mackey TK, Miner A, Cuomo RE. Exploring the e-cigarette e-commerce marketplace: identifying Internet e-cigarette marketing characteristics and regulatory gaps. *Drug Alcohol Depend*. 2015;156:97–103



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## Measurement and predictive value of susceptibility to cigarettes, e-cigarettes, cigars, and hookah among Texas adolescents

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### ABSTRACT

Susceptibility to cigarette smoking, defined as the lack of a firm commitment not to smoke in the future, begins in childhood and is a phase in the transition from never to ever use of cigarettes. While a consistent and validated predictor of cigarette use, little research has assessed whether the susceptibility construct applies equally well across other tobacco products. Baseline data were collected in 2014–2015 from a representative sample of ( $n = 2844$ ) middle and high school students in five counties surrounding the four largest cities in Texas, (49% female and mean age 13.13 years, with subsequent waves at 6, 12, and 18 months. Confirmatory factor analysis examined the appropriateness of a three-item susceptibility measure (product-specific curiosity, intention to use, and peer influence) across product types and ethnic groups (Hispanic versus non-Hispanic). Logistic regression examined whether product specific susceptibility at baseline predicted future product initiation. At baseline, 11.5%, 17.0%, 17.4% and 29.4%, of adolescent never users were susceptible to cigars, cigarettes, hookah and e-cigarettes, respectively; significantly more Hispanic than non-Hispanic adolescents were susceptible to e-cigarettes (32.4% versus 26%,  $p < 0.01$ ) and cigarettes (19.9% versus 13.9%,  $p < 0.05$ ). Product-specific items were significantly and consistently associated with the respective underlying susceptibility product construct and across ethnic groups ( $p < 0.001$  for all). Susceptibility to e-cigarettes (AOR = 2.28–6.64) or any combustible product (cigarettes, hookah, cigars; AOR = 3.38–5.20) significantly predicted subsequent ever use. This study confirms the appropriateness of the susceptibility construct across four tobacco product types and ethnic groups, and the utility of susceptibility in predicting future product use among adolescents.

### 1. Introduction

Use of conventional tobacco products, like cigarettes and cigars, has decreased in recent years among adolescents, while use of tobacco products, like e-cigarettes and hookah, continues to increase (Singh et al., 2016). These trends and the growing popularity of specific products call for identifying risk factors that predict product use initiation. Numerous studies have demonstrated susceptibility to cigarettes among never smoking adolescents is associated with increased risk of experimentation with cigarettes and becoming an established smoker (Jackson, 1998; Jackson & Dickinson, 2004; Nodora et al., 2014; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996; Pierce, Distefan, Kaplan, & Gilpin, 2005; Spelman et al., 2009; Strong et al., 2015; Unger, Johnson, Stoddard, Nezami, & Chou, 1997). Limited research suggests that susceptibility to e-cigarettes or hookah independently predicts future e-cigarette (Bold, Kong, Cavallo, Camenga, & Krishnan-Sarin, 2017) or hookah use (Lipkus, Reboussin, Wolfson, & Sutfin, 2015), respectively, and that susceptibility to cigarettes predicts future e-cigarette and cigar use (Cole, Kennedy, Chaurasia, & Leatherdale, 2017). Still, few studies have examined product-specific susceptibility measures in predicting future use of products other than cigarettes.

Susceptibility, which reflects the lack of a firm commitment not to

use tobacco products in the future, is a critical construct, predictive of tobacco use and amenable to intervention. Research examining the initial susceptibility construct based on behavioral intentions, peer influence, and self-efficacy (Pierce et al., 1996) demonstrated that comprehensive community anti-smoking media programs, are effective in altering and suppressing adolescents' susceptibility to smoking (Meshack et al., 2004). A revised measure of the susceptibility construct, which incorporated curiosity with behavioral intentions and peer influence, demonstrated little loss in internal consistency, but a reduction in predictive validity and accuracy (Pierce et al., 2005). To date, a few studies have assessed whether the original susceptibility to cigarettes construct (Pierce et al., 1996) also can be adapted to measure susceptibility to other products, like e-cigarettes, hookah, and cigars (e.g., Bold et al., 2017; Lechner et al., 2018), and none have examined the susceptibility construct that includes curiosity. Yet, recent survey data suggest that the most common reason for adolescents to try e-cigarettes is out of curiosity (Kong, Morean, Cavallo, Camenga, & Krishnan-Sarin, 2015; Patrick et al., 2016). Thus, utilizing a susceptibility construct that includes curiosity might be particularly useful to our understanding of susceptibility to non-cigarette tobacco products.

Additionally, no studies have assessed whether the susceptibility construct (Pierce et al., 2005) functions equally across ethnic groups.

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Table 1

Demographics and susceptibility to e-cigarettes and combustible tobacco products among Hispanic and non-Hispanic never users at baseline, TATAMS ( $n = 2844$ ;  $N = 318,097$ ).

Variable	Hispanic	Non-Hispanic	Total
	% (95% CI)	% (95% CI)	% (95% CI)
<b>Sex</b>			
Female	47.7 (41.1–54.5)	50.3 (45.1–55.5)	49.0 (43.7–54.3)
Male	52.3 (45.5–58.9)	49.7 (44.5–54.9)	51.0 (45.7–56.3)
<b>Grade</b>			
6	39.8 (28.4–52.5)	36.6 (23.6–52.0)	38.3 (26.9–51.1)
8	35.3 (24.4–48.0)	34.4 (20.2–51.9)	34.9 (23.7–47.9)
10	24.9 (15.1–38.3)	29.0 (18.4–42.7)	26.9 (17.7–38.6)
Age (mean, SE)	13.14 (0.19)	13.12 (0.19)	13.13 (0.17)
<b>Family SES</b>			
High	15.8 (12.9–19.3)	25.2 (18.7–33.0)	20.3 (16.2–25.1)
Middle	64.4 (61.2–67.5)	61.6 (56.2–66.7)	63.1 (60.2–65.9)
Low	19.8 (16.8–23.2)	13.2 (10.1–17.2)	16.6 (14.1–19.6)
<b>Susceptibility to e-cigarettes items<sup>a</sup></b>			
Have you ever been curious about smoking/using e-cigarettes?	26.9 (23.5–30.7)	22.2 (19.0–25.9)	24.7 (21.9–27.7)*
Do you think you will use e-cigarettes in the next 12 months?	10.5 (8.3–13.1)	8.0 (6.1–10.4)	9.3 (7.6–11.3)
If one of your close friends were to offer you an e-cigarette, would you use it?	17.9 (15.1–21.1)	13.0 (10.7–15.6)	15.6 (13.6–17.7)*
<b>Susceptibility to e-cigarettes (derived)<sup>b</sup></b>	32.4 (28.7–36.3)	26.0 (22.3–30.1)	29.4 (26.2–32.7)**
<b>Susceptibility to cigars (large cigars, cigarillos, and little filtered cigars) items<sup>d</sup></b>			
Have you ever been curious about smoking/using cigars?	7.6 (5.6–10.3)	7.0 (5.3–9.0)	7.3 (6.0–8.8)
Do you think you will use cigars in the next 12 months?	4.3 (2.8–6.5)	3.2 (2.2–4.6)	3.8 (2.8–5.0)
If one of your close friends were to offer you a cigar, would you use it?	7.4 (5.0–10.8)	4.5 (3.2–6.2)	6.0 (4.6–7.8)
<b>Susceptibility to cigars (derived)<sup>b</sup></b>	12.8 (9.7–16.7)	10.2 (7.9–13.0)	11.5 (9.5–13.9)
<b>Susceptibility to hookah items<sup>d</sup></b>			
Have you ever been curious about smoking/using hookah?	14.7 (11.8–18.2)	12.5 (9.6–16.2)	13.7 (11.3–16.4)
Do you think you will use hookah in the next 12 months?	6.9 (5.0–9.4)	5.3 (3.6–7.6)	6.1 (4.6–8.1)
If one of your close friends were to offer you hookah, would you use it?	9.8 (7.6–12.6)	7.8 (5.8–10.5)	8.9 (7.2–10.9)
<b>Susceptibility to hookah (derived)<sup>b</sup></b>	18.8 (15.2–23.1)	15.7 (12.1–20.2)	17.4 (14.6–20.6)
<b>Susceptibility to cigarettes items<sup>d</sup></b>			
Have you ever been curious about smoking/using cigarettes?	13.3 (10.8–16.4)	10.0 (8.3–12.1)	11.8 (10.1–13.7)*
Do you think you will use cigarettes in the next 12 months?	5.1 (3.4–7.4)	3.9 (2.8–5.4)	4.5 (3.5–5.8)
If one of your close friends were to offer you cigarettes, would you use it?	8.4 (5.8–12.0)	6.2 (4.6–8.2)	7.3 (5.7–9.3)
<b>Susceptibility to cigarettes (derived)<sup>b</sup></b>	19.9 (15.6–25.0)	13.9 (11.5–16.7)	17.0 (14.4–20.0)*
<b>Susceptibility to any combustible tobacco product (derived)<sup>b</sup></b>	29.1 (24.5–34.1)	22.9 (18.8–27.7)	26.2 (22.7–29.9)*

Note: CI = confidence interval, SE = standard error. All frequencies and means are weighted to account for complex survey design. Never users represent adolescents who have never used any of the four product types.  $n$  represents the observed sample size,  $N$  represents the weighted sample size. "Any combustible" includes cigarettes, cigars, and hookah. \* $p < 0.05$ , \*\* $p < 0.01$  for Chi-square test of Hispanic versus non-Hispanic across categories of the item.

<sup>a</sup> For set of items, % (95% CI) represents the proportion of adolescents who said anything other than "not at all curious" to the first item and "definitely not" to the second two items.

<sup>b</sup> For items, % (95% CI) represents the proportion of adolescents classified as susceptible.

Hispanic adolescents who have never smoked report greater intentions to smoke cigarettes in the future compared to white peers (Bunnell et al., 2015) and greater curiosity about e-cigarettes (Margolis, Nguyen, Slavitt, & King, 2016). In addition, Hispanic adolescents are more susceptible to cigarettes (Gulmer et al., 2015; Gato et al., 2003), e-cigarettes (Singh et al., 2016), cigars (Singh et al., 2016), and hookah (Trinidad et al., 2017), compared to non-Hispanic white adolescents. This is a concern because comparatively, Hispanics are the youngest ethnic group in the nation, with a large proportion of the Hispanic population (roughly a third) being under the age of 18 years (Patten, 2016), and Hispanic youth report a higher prevalence of e-cigarette use in middle school in the past 30 days compared to non-Hispanic youth of all races (Singh et al., 2016). Considering existing tobacco-related health disparities (Centers for Disease Control and Prevention, 2018) and the expected near doubling of the Hispanic population over the next 30 years (Krogstad, 2014), it is important to determine whether constructs predicting future use, like susceptibility, are applicable across ethnic groups. Such information can inform the development of culturally sensitive interventions and communication campaigns designed to reduce susceptibility and ultimately product use.

The goal of this study was to evaluate the utility of a three-item susceptibility construct adapted from Pierce et al. (2005), assessing curiosity, intention to use, and peer influence, in measuring susceptibility at baseline to four products (e-cigarettes, hookah, cigars, and

cigarettes) and in predicting future initiation of these products among Hispanic and non-Hispanic adolescent never users in grades 6, 8, and 10 in Texas. We hypothesized the measurement of susceptibility would apply equally across products, and each product-specific susceptibility construct would predict future use of each product. We also hypothesized the measurement of susceptibility constructs for each product would apply equally across Hispanic and non-Hispanic subgroups, though prevalence of susceptibility to each product may be higher for Hispanic adolescents.

## 2. Methods

### 2.1. Study design and participants

The Texas Adolescent Tobacco and Marketing Surveillance system (TATAMS) is a rapid response surveillance system that follows three population-based cohorts of adolescents, to represent developmental changes in tobacco use behaviors. A complex probability design was used to recruit 3907 students ( $n$ ) in 79 middle and high schools in 4 major metropolitan areas of Texas (Austin, San Antonio, Dallas-Ft. Worth, & Houston); when sampling weights are applied in statistical data analyses, results are representative of 461,069 ( $N$ ) students who were enrolled in the 6th, 8th, and 10th grades in 1969 middle and high schools in these cities during the 2014–15 academic year. Further details about TATAMS' sampling methods and recruitment are described



elsewhere in Pérez et al. (2017). Active parental consent was obtained for all surveys, for all students.

Baseline data were collected during the 2014–2015 academic year from 3907 students via web-based surveys administered on tablets in the classroom, with three follow-up data collection periods occurring 6, 12, and 18 months after baseline via similarly formatted web-based surveys administered outside the classroom. At 6 months 64% were retained, at 12 months 70% were retained, and at 18 months 74% were retained. These retention rates are comparable to other cohorts nationwide with similar data collection schedules and incentive structures (Cantrell et al., 2018). Survey items were adapted from valid and reliable measures used for state and national tobacco surveillance, like the Population Assessment of Tobacco and Health (PATH) study (Hyland et al., 2017); cognitive interviewing among students, aged 11–18, assessed the reliability and content validity of all survey questions. The final survey included over 340 items assessing socio-demographic factors, tobacco use behaviors, cognitive and affective factors, and exposure to tobacco marketing. The median number of questions received by students was 137, with an average administration time of 45 minutes. The majority of students (58.1%) answered all items, and 92% of students answered 96% or more of the items (Delk, Harrell, Fakhouri, Muir, & Perry, 2017). Active consent from parents/guardians and assent from students were obtained for all data collection waves. TATAMS was approved by the University of Texas Health Science Center at Houston Institutional Review Board (HSC-SPH-13-0377).

The population for this study was limited to 2844 adolescents, or 72.8% of those enrolled at baseline, classified as never users of any product at baseline (i.e., a never user of e-cigarettes, cigars, hookah, and cigarettes) with complete data on all sociodemographic variables. Sampling weights were utilized, allowing the study population to be representative of 318,097 students enrolled in 6th, 8th, and 10th grades at baseline in these five Texas counties. As can be seen in Table 1, at baseline, sex was equally distributed (51% male), 38.3% of adolescents were in grade 6, and mean age was 13.13 (SE = 0.17). Most adolescents had a middle range family socioeconomic status (SES) (63.1%). Hispanic adolescents represented 52.4% of the study population. Of note, the Hispanic ( $n = 1430$ ) and non-Hispanic ( $n = 1414$ ) youth included in this analysis did not differ in terms of susceptibility to any of the four products examined to those excluded from the analysis due to missing covariates ( $p < 0.05$  for all; data not shown).

## 2.2. Measures

### 2.2.1. Susceptibility

Susceptibility to four product classes was examined among never users of any product: 1) e-cigarettes, 2) cigars (large cigars, cigarillos, and little filtered cigars), 3) hookah, and 4) cigarettes. Susceptibility to each product was assessed by three items asking, “Have you ever been curious about smoking/using [this product]?”, “Do you think you will use [this product] in the next 12 months?”, and “If one of your close friends were to offer you [this product], would you use it?” Response options included “Not at all curious,” “A little curious,” “Somewhat curious,” or “Very curious” for the first item and “Definitely not,” “Probably not,” “Probably yes,” or “Definitely yes” for the other two items. These items are adapted from a four item measure that has demonstrated good internal consistency in prior studies ( $\alpha = 0.74$ ) (Pierce et al., 2005) and is a strong predictor of future cigarette experimentation (Pierce et al., 1996, 2005).

Adolescents were categorized as non-susceptible to each individual item if they responded “Not at all curious” or “Definitely not,” with any other response categorized as susceptible. Derived susceptibility variables were created for each product, with individuals who were non-susceptible to all three items categorized as non-susceptible, those who were susceptible to one or more items categorized as susceptible, and those who were missing on any item labeled as missing. Susceptibility to any combustible product was derived based on susceptibility to

cigars, hookah, and cigarettes, with individuals who were non-susceptible to all three products categorized as non-susceptible, those who were susceptible to one or more products categorized as susceptible, and those who were missing on susceptibility variables for all three products labeled as missing.

### 2.2.2. Ever use

E-cigarette, cigar, hookah, and cigarette ever use were measured at 6, 12, and 18 months by one item each asking, “Have you ever smoked/used [this product], even one or two puffs?” with “Yes” responses classified as ever users of each product and “No” responses classified as never users. Ever use of any combustible product was measured based on whether adolescents were classified as ever users of any of the three combustible products (cigars, hookah, or cigarettes).

### 2.2.3. Covariates

Covariates included sex (male or female), grade level (6, 8, or 10), age (range: 10–18 years), ethnicity, and family SES. Ethnicity was dichotomized as Hispanic versus non-Hispanic, which includes non-Hispanic adolescents of white, black, and other races. Family SES was measured by one item asking, “In terms of income, what best describes your family’s standard of living in the home where you live most of the time?” with response options categorized as high (“very well off”), middle (“living comfortably”), and low (“just getting by,” “nearly poor,” and “poor”) (Gore, Aseltine Jr., & Colten, 1992; Romero, Cuéllar, & Roberts, 2000; Springer, Selwyn, & Kelder, 2006).

## 2.3. Analyses

The distribution of demographic and susceptibility measures across the total study population and by ethnicity were examined, and Chi-square tests assessed statistically significant differences between Hispanic and non-Hispanic adolescents across categories of these items.

Confirmatory factor analysis (CFA) assessed the fit of the three-item susceptibility construct for each of the four products among the total population and by ethnicity, using a robust weighted least squares approach with mean and variance adjusted estimation. CFA models were evaluated based on significance and size of model parameter estimates, and overall goodness-of-fit parameters, including the root mean square error of approximation (RMSEA, values  $< 0.06$  indicate good fit), the comparative fit index (CFI, values  $> 0.95$  indicate good fit), the Tucker-Lewis index (TLI, values  $> 0.95$  indicate good fit), and the weighted root mean square residual (WRMR, values  $< 1.0$  indicate good fit) (Hu & Bentler, 1999; Yu, 2002).

Following confirmation that each susceptibility construct fit appropriately across products and ethnicities, the predictive value of each derived susceptibility variable on future use of each product was examined at 6, 12, and 18 months among the total population and by ethnicity using Chi-square tests. Due to low numbers of ever users of combustible products, ever use of cigars, hookah, and cigarettes were combined as ever use of any combustible product, and logistic regression models examined the effect of susceptibility to e-cigarettes and any combustible product, separately, at baseline on ever use of these products at follow-up, adjusted for sex, age, family SES, and ethnicity.

All analyses were conducted using Stata 14.0 (College Station, TX) and Mplus Version 7 (Los Angeles, CA), utilizing complete case analysis of never users of any product at baseline. Analyses also incorporated sampling weights and considered clustering within school districts and stratification of schools based on proximity to point of sale tobacco outlets to account for complex design (Pérez et al., 2017).

## 3. Results

### 3.1. Descriptive statistics

At baseline (Table 1), the most commonly endorsed susceptibility



item across products was curiosity (24.7% for e-cigarettes, 13.7% for hookah, 11.8% for cigarettes, and 7.3% for cigars), while the least commonly endorsed item was intention to use (9.3% for e-cigarettes, 6.1% for hookah, 4.5% for cigarettes, and 3.8% for cigars). Based on derived susceptibility variables, 29.4% of adolescents were susceptible to e-cigarettes, 17.4% susceptible to hookah, 17.0% susceptible to cigarettes, and 11.5% susceptible to cigars; 26.2% were susceptible to any combustible product (hookah, cigarettes, or cigars).

Significant differences between Hispanic and non-Hispanic adolescents were observed for family SES, e-cigarette susceptibility, cigarette susceptibility, and susceptibility to any combustible product. For e-cigarette susceptibility, Hispanic adolescents, compared to non-Hispanic adolescents, endorsed curiosity (26.9% versus 22.2%) and peer influence (17.9% versus 13.0%) items more often and had a higher prevalence of being susceptible (32.4% versus 26.0%). For cigarette susceptibility, Hispanic adolescents, compared to non-Hispanic adolescents, endorsed curiosity more often (13.3% versus 10.0%) and had a higher prevalence of being susceptible (19.9% versus 13.9%). Hispanic adolescents had a higher prevalence of being susceptible to any combustible product (29.1%) compared to non-Hispanic adolescents (22.9%).

### 3.2. Confirmatory factor analysis

For the CFA among the total population and by Hispanic and non-Hispanic ethnicity (Table 2), parameter estimates for each item (curiosity, intention to use, and peer influence) were significant ( $p < 0.001$ ) and displayed large loadings onto product specific susceptibility latent factors. Goodness-of-fit statistics suggested each susceptibility model was an appropriate fit to the data (RMSEA  $< 0.06$ , CFI  $> 0.95$ , TLI  $> 0.95$ , WRMR  $< 1.0$  for all) among the total population and Hispanic and non-Hispanic groups specifically.

Among the total population, peer influence displayed the largest factor loading for e-cigarette susceptibility ( $\beta = 0.980$ , SE = 0.029), cigarette susceptibility ( $\beta = 0.904$ , SE = 0.055), and hookah susceptibility ( $\beta = 0.951$ , SE = 0.025), while intention to use displayed the largest factor loading for cigar susceptibility ( $\beta = 0.928$ , SE = 0.042). Curiosity displayed the lowest loading for all susceptibility constructs among the total population ( $\beta = 0.802$ , SE = 0.036 for e-cigarettes;  $\beta = 0.644$ , SE = 0.070 for cigarettes;  $\beta = 0.818$ , SE = 0.043 for hookah;  $\beta = 0.755$ , SE = 0.052 for cigars).

Results were consistent overall when examining each construct

among Hispanic and non-Hispanic groups, with two exceptions. Among Hispanic adolescents only, intention to use displayed the largest factor loading ( $\beta = 0.888$ , SE = 0.090) for cigarette susceptibility, while peer influence displayed the largest factor loading ( $\beta = 0.931$ , SE = 0.070) for cigar susceptibility. Additional tests to examine differences in the measurement of each product specific construct when ethnicity is included in the model, ethnicity was significant to the measurement of susceptibility to e-cigarettes, but not to the measurement of susceptibility to other products (results not shown). However, the overall model fit, as well as factor loadings and the significance of each susceptibility item, remained consistent with e-cigarette models presented in Table 2.

### 3.3. Predictive validity

Among the total population, there were significant differences in ever use at 6, 12, and 18 months based on susceptibility status at baseline for e-cigarettes, cigarettes, hookah, and any combustible product (Fig. 1). Specifically, 6.3% of adolescents susceptible to e-cigarettes at baseline used e-cigarettes at 6 months, 11.3% at 12 months, and 13.8% at 18 months, versus 0.9%, 2.1%, and 4.6% of non-susceptible adolescents, respectively ( $p < 0.05$  for all). Of those susceptible to cigarettes at baseline, 2.6% used cigarettes at 6 months, 6.6% at 12 months, and 9.4% at 18 months, versus 0.7%, 1.5%, and 2.8% of non-susceptible adolescents, respectively ( $p < 0.05$  for all). Of those susceptible to hookah at baseline, 1.3% used hookah at 6 months, 2.7% at 12 months, and 3.8% at 18 months, versus 0%, 0.2%, and 0.4% of non-susceptible adolescents, respectively ( $p < 0.05$  for all). Among adolescents susceptible to any combustible product at baseline, 3.7% used any combustible product at 6 months, 7.4% at 12 months, and 12.3% at 18 months, versus 0.7%, 1.7%, and 3.5% of non-susceptible adolescents, respectively ( $p < 0.05$  for all). There were no significant differences in cigar ever use at any time point based on susceptibility to cigars at baseline.

When ethnicity was considered as a potential effect modifier of these relationships, few differences were noted. Among Hispanic adolescents, there were no significant differences in cigarette ever use at 6 months based on susceptibility to cigarettes at baseline; significant differences in ever use only emerged at 12 and 18 months ( $p < 0.05$  for both). Among non-Hispanic adolescents, there were significant differences in cigar ever use at 12 and 18 months based on susceptibility to cigars at baseline, with 4.2% of susceptible adolescents using at

**Table 2**

Confirmatory factor analysis of susceptibility items for each product, total population and by ethnicity among never users at baseline, TATAMS ( $n = 2844$ ;  $N = 318,097$ ).

Susceptibility constructs	Total			Hispanic			Non-Hispanic		
	Factor loading	S.E.	p-Value	Factor loading	S.E.	p-Value	Factor loading	S.E.	p-Value
<b>E-cigarettes</b>									
Curiosity	0.802	0.036	$< 0.001$	0.781	0.050	$< 0.001$	0.824	0.041	$< 0.001$
Intention	0.865	0.029	$< 0.001$	0.825	0.049	$< 0.001$	0.914	0.026	$< 0.001$
Friends	0.980	0.029	$< 0.001$	1.000	0.041	$< 0.001$	0.958	0.031	$< 0.001$
<b>Cigarettes</b>									
Curiosity	0.644	0.070	$< 0.001$	0.565	0.111	$< 0.001$	0.735	0.079	$< 0.001$
Intention	0.856	0.054	$< 0.001$	0.888	0.090	$< 0.001$	0.831	0.054	$< 0.001$
Friends	0.904	0.055	$< 0.001$	0.858	0.072	$< 0.001$	0.948	0.073	$< 0.001$
<b>Hookah</b>									
Curiosity	0.818	0.043	$< 0.001$	0.792	0.071	$< 0.001$	0.854	0.053	$< 0.001$
Intention	0.934	0.024	$< 0.001$	0.949	0.032	$< 0.001$	0.912	0.031	$< 0.001$
Friends	0.951	0.025	$< 0.001$	0.959	0.033	$< 0.001$	0.935	0.034	$< 0.001$
<b>Cigars</b>									
Curiosity	0.755	0.052	$< 0.001$	0.728	0.076	$< 0.001$	0.796	0.052	$< 0.001$
Intention	0.928	0.042	$< 0.001$	0.909	0.064	$< 0.001$	0.943	0.045	$< 0.001$
Friends	0.897	0.049	$< 0.001$	0.931	0.070	$< 0.001$	0.858	0.066	$< 0.001$

Note: SE = standard error. Cigars include large cigars, cigarillos, and little filtered cigars. Factor loadings for each confirmatory factor analysis model are a measure of how well each specific item loads onto the respective factor (i.e., susceptibility construct), ranging from 0 (poor association) to 1 (strong association).



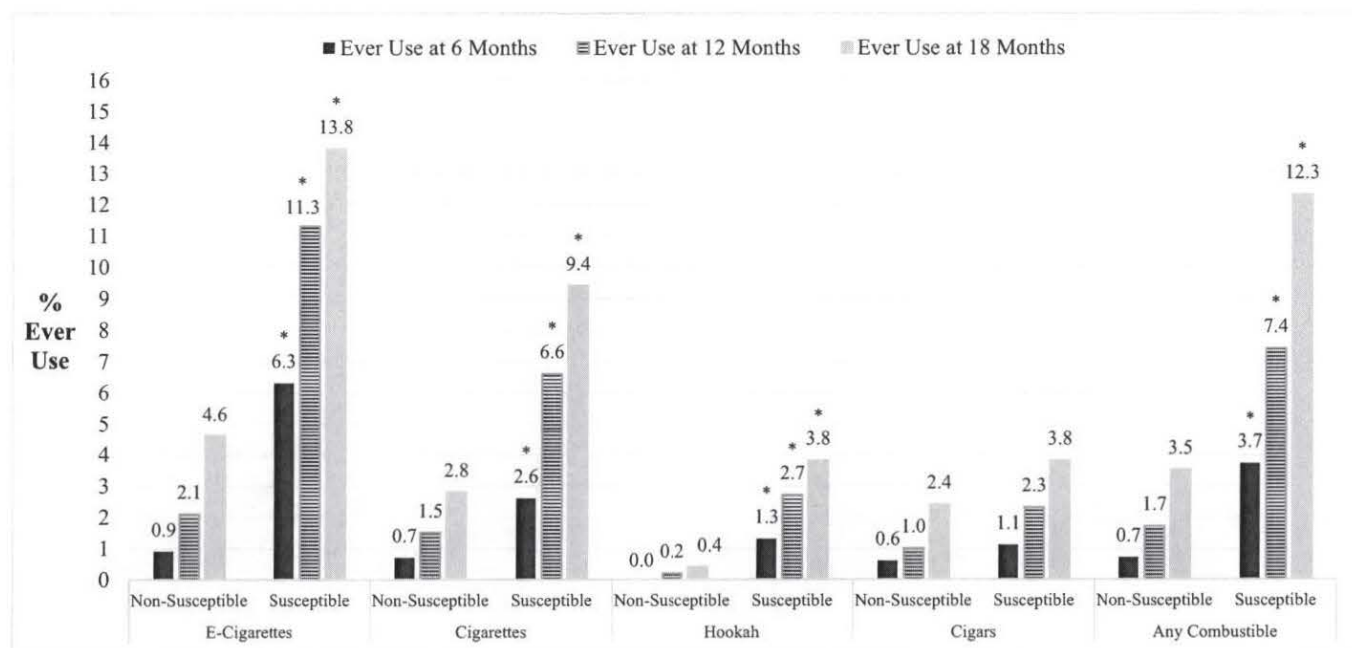


Fig. 1. Comparison of susceptibility at baseline among never users and subsequent ever use of each product at 6, 12, and 18 months. Note: \* indicates  $p < 0.05$  for the Chi-square test of group differences in ever use of each specific product at each time point by susceptibility status for each specific product at baseline.

12 months and 5.9% at 18 months, versus 0.9% and 1.7% of non-susceptible adolescents, respectively ( $p < 0.05$  for both).

In the adjusted logistic regression models (Table 3) examining the association between susceptibility and ever use at 6, 12, and 18 months for e-cigarettes, age was the only covariate significantly associated with ever use at any time point. Each year increase in age was associated with 1.46 (95% CI: 1.17–1.82), 1.55 (95% CI: 1.31–1.84), and 1.33 (95% CI: 1.08–1.64) times higher odds of e-cigarette ever use at 6, 12, and 18 months, respectively. Similarly, susceptibility to e-cigarettes significantly predicted ever use across time points, with susceptible adolescents having 6.64 (95% CI: 3.39–13.00), 5.01 (95% CI: 2.69–9.34), and 2.88 (95% CI: 1.66–4.97) times higher odds of e-cigarette ever use at 6, 12, and 18 months, respectively, compared to non-susceptible adolescents.

For models considering any combustible product, age was significantly associated with ever use, with each year increase in age being associated with 1.33 (95% CI: 1.09–1.62) and 1.34 (95% CI: 1.16–1.54)

times higher odds of ever use of any combustible product at 12 and 18 months, respectively. Similarly, susceptibility to any combustible product significantly predicted ever use at all time points, with susceptible adolescents having 5.20 (95% CI: 1.92–14.07), 3.89 (95% CI: 2.17–6.95), and 3.38 (95% CI: 2.03–5.62) times higher odds of ever use of any combustible product at 6, 12, and 18 months, respectively, compared to non-susceptible adolescents. There were no significant interactions between ethnicity and susceptibility to e-cigarettes or any combustible product at any time point.

#### 4. Discussion

Among this population of Texas adolescents, we observed the three-item susceptibility measure adapted from Pierce et al. (2005) was robust across tobacco products and ethnic groups. Consistent with our first hypothesis and past research examining susceptibility in the context of cigarettes (Nodora et al., 2014; Pierce et al., 1996, 2005), we

Table 3

Adjusted logistic regression of susceptibility to each product at baseline on ever use at 6 months, 12 months, and 18 months among never users at baseline ( $n = 2844$ ;  $N = 318,097$  at baseline).

Variable		Ever use at 6 months			Ever use at 12 months			Ever use at 18 months		
		OR	95% CI	p-Value	OR	95% CI	p-Value	OR	95% CI	p-Value
E-cigarettes										
Sex (ref: female)	Male	1.30	0.61–2.76	0.488	1.08	0.73–1.61	0.700	1.31	0.88–1.96	0.185
Age		1.46	1.17–1.82	0.001	1.55	1.31–1.84	< 0.001	1.33	1.08–1.64	0.008
Family SES (ref: middle)	High	1.65	0.55–4.98	0.368	1.00	0.45–2.20	0.993	1.24	0.63–2.44	0.521
	Low	0.64	0.22–1.89	0.412	0.45	0.18–1.12	0.085	0.83	0.33–2.07	0.682
Ethnicity (ref: non-Hispanic)	Hispanic	1.29	0.60–2.76	0.599	0.99	0.60–1.63	0.966	0.93	0.60–1.44	0.740
Susceptible to e-cigarettes (ref: no)	Yes	6.64	3.39–13.00	< 0.001	5.01	2.69–9.34	< 0.001	2.88	1.66–4.97	< 0.001
Any combustible product										
Sex (ref: female)	Male	0.85	0.33–2.15	0.725	0.97	0.50–1.89	0.920	1.05	0.59–1.87	0.867
Age		1.18	0.88–1.59	0.267	1.33	1.09–1.62	0.005	1.34	1.16–1.54	< 0.001
Family SES (ref: middle)	High	0.54	0.10–2.81	0.458	1.17	0.58–2.38	0.662	1.30	0.74–2.26	0.356
	Low	1.08	0.29–4.03	0.904	1.21	0.49–3.03	0.673	1.19	0.59–2.43	0.620
Ethnicity (ref: non-Hispanic)	Hispanic	0.74	0.27–2.14	0.575	0.97	0.48–1.95	0.930	0.99	0.61–1.63	0.983
Susceptible to any combustible (ref: no)	Yes	5.20	1.92–14.07	0.001	3.89	2.17–6.95	< 0.001	3.38	2.03–5.62	< 0.001

Note: OR = odds ratio, CI = confidence interval, SES = socioeconomic status. "Any combustible" includes cigarettes, cigars, and hookah.



confirmed curiosity, intention to use, and peer influence are significant and appropriate items to consider in measuring susceptibility to e-cigarettes, cigarettes, hookah, and cigars among this adolescent population. Across products, we observed minor differences in the strength of each item. Specifically, curiosity had the weakest relationship with the underlying susceptibility construct across all products, peer influence had the strongest relationship with susceptibility to e-cigarettes, cigarettes, and hookah, and future intentions had the strongest relationship with susceptibility to cigars. While all three factors may be influential in determining adolescent susceptibility to tobacco products, intervention efforts to alter susceptibility may need to be tailored by product.

We observed almost 30% of adolescents were susceptible to e-cigarettes at baseline, a prevalence nearly double that of each individual combustible product. Adolescents may be more susceptible to e-cigarettes than other products, and more research is needed to investigate factors driving increased susceptibility, like the appeal of flavors (Ambrose et al., 2015) or increased television and digital media marketing (Duke et al., 2014; Mantey, Cooper, Clendennen, Pasch, & Perry, 2016; Pierce et al., 2017). As expected, we observed susceptibility to e-cigarettes and combustible products predicts product use at time points 6, 12, and 18 months in the future. This is consistent with previous research (Bold et al., 2017; Cole et al., 2017; Jackson, 1998; Jackson & Dickinson, 2004; Nodora et al., 2014; Pierce et al., 1996, 2005; Spelman et al., 2009; Strong et al., 2015; Unger et al., 1997) and suggests targeting and lessening susceptibility through intervention efforts remains a significant factor in preventing initiation of multiple forms of product use among adolescents.

Of note, the declining magnitude of the odds ratios predicting initiation from any combustible product over time was not statistically different from each other, based on a comparison of their 95% confidence intervals. In contrast, the declining odds ratios for susceptibility to e-cigarette use over time show a significant drop in influence on ever use at 18 months from susceptibility assessed at baseline. This suggests that by 18 months when compared to 6 and 12 months, other factors exert a stronger influence on experimentation relative to susceptibility status assessed 18 months earlier. In turn, this suggests that assessing susceptibility to e-cigarettes more frequently may be necessary to inform the development of targeted long-term interventions, as is identification of other factors that may be proximally related to e-cigarette use.

Congruous with our second hypothesis, we found the measurement of each susceptibility construct across products applied equally well across ethnic groups. Results among groups were consistent with the entire population, with minor differences. Among Hispanic adolescents, intention to use had the strongest relationship with susceptibility to cigarettes, while peer influence had the strongest relationship among non-Hispanic adolescents. In contrast, peer influence had the strongest relationship with susceptibility to cigars among Hispanic adolescents, while intention to use had the strongest relationship among non-Hispanic adolescents. Additionally, ethnicity was significant to the measurement of susceptibility to e-cigarettes as a whole; the differences in the model when considering ethnicity suggest that while the measurement of susceptibility to e-cigarettes is valid across ethnic groups, the meaning of the construct may vary slightly depending on ethnicity. Thus, while it is appropriate to utilize the same susceptibility measure across ethnic groups, specific influences may be more relevant to predicting susceptibility for Hispanics vs. non-Hispanics depending on product type, and specifically, susceptibility to e-cigarettes should be considered separately by ethnicity.

While we expected Hispanic adolescents would have a higher prevalence of susceptibility to each product than non-Hispanic adolescents, this was observed only for e-cigarettes and cigarettes, with curiosity about these products endorsed more often among Hispanic adolescents. This is consistent with previous research (Margolis et al., 2016), and notable, as curiosity predicts future experimentation with smoking

independent of susceptibility (Pierce et al., 2005), warranting further examination of factors leading Hispanic adolescents to be more curious about these products. Despite a higher reported prevalence of susceptibility to e-cigarettes and cigarettes among Hispanic adolescents, no significant interactions were observed between ethnicity and susceptibility in predicting future use. Although more Hispanic adolescents are susceptible to e-cigarettes and cigarettes than their non-Hispanic peers (and Hispanic adolescents endorse curiosity about products more than non-Hispanic peers), the relationship between the measure of susceptibility itself and ever use of e-cigarettes and cigarettes is consistent across ethnic groups. This suggests that tailoring interventions designed to ameliorate susceptibility among Hispanics to address curiosity might be particularly useful.

#### 4.1. Strengths and limitations

One study limitation is the low prevalence of ever users at future time points for specific products, like hookah and cigars. This prevented examination of susceptibility to these products separately at baseline regarding future use; thus, we cannot draw conclusions about specific predictive validity of susceptibility to individual combustible products. Still, our examination of combustible products as a whole provides evidence for susceptibility as a predictor of product use among adolescents. Additionally, our three-item construct only includes a single measure of intentions to use tobacco in the future, rather than both measures originally considered by Pierce et al. (2005), which may limit the ability to make comparisons between our susceptibility measures and those used in other studies. Next, this study population is limited by geography, so findings may not be generalizable to adolescents outside Texas. Finally, despite utilizing measures adapted from established surveys (Hyland et al., 2017) and thorough cognitive testing, self-report of data may lead to response bias.

Despite limitations, this study is strengthened by the large, diverse population of Texas adolescents, which provided adequate power to examine specific associations across ethnic groups and products. The complex survey design and use of analyses accounting for sampling weights and clustering within schools yield results representative of the overall population of urban Texas adolescents in grades 6, 8, and 10. This study's longitudinal design and breadth of tobacco products allows for investigation of all products concurrently, within the same population and across time points, permitting temporal conclusions about the role of susceptibility on future initiation, and extending past research, which has yet to examine multiple product types longitudinally among the same cohort.

#### 4.2. Conclusions

Susceptibility is a key construct for predicting future initiation of tobacco; past research has examined its validity relevant to cigarettes, but not among contemporary adolescent populations and the changing landscape of tobacco products. This study confirms the appropriateness of the measurement of susceptibility (Pierce et al., 2005) across four products (e-cigarettes, hookah, cigars, and cigarettes) and ethnic groups (Hispanic versus non-Hispanic), and the utility of susceptibility in predicting future tobacco product use among adolescents. Implications for intervention and research emphasize the importance of susceptibility in predicting initiation of product use and the need to investigate factors influencing susceptibility to specific products, like e-cigarettes, especially among Hispanic adolescents.

#### Compliance with ethical standards

##### *Ethical approval*

TATAMS was approved by the University of Texas Health Science Center at Houston Institutional Review Board (HSC-SPH-13-0377). All



procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

### Role of funding sources

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### Contributors

FRC and EAC conducted the analysis. FRC led the writing and completed the initial draft. AVW and MBH conceptualized and supervised the analysis, and provided critical feedback. CLP provided critical feedback.

### Conflict of interest

The authors declare that they have no conflict of interest.

### References

- Ambrose, B. K., Day, H. R., Rostron, B., Conway, K. P., Borek, N., Hyland, A., & Villanti, A. C. (2015). Flavored tobacco product use among U.S. youth aged 12–17 years, 2013–2014. *The Journal of the American Medical Association*, 314(17), 1871–1873. <https://doi.org/10.1001/jama.2015.13802>.
- Bold, K. W., Kong, G., Cavallo, D. A., Camenga, D. R., & Krishnan-Sarin, S. (2017). E-cigarette susceptibility as a predictor of youth initiation of e-cigarettes. *Nicotine & Tobacco Research*, 20(1), 140–144. <https://doi.org/10.1093/ntr/ntw393>.
- Bunnell, R. E., Agaku, I. T., Arrazola, R. A., Apelberg, B. J., Caraballo, R. S., Corey, C. G., ... King, B. A. (2015). Intentions to smoke cigarettes among never-smoking U.S. middle and high school electronic cigarette users: National youth tobacco survey, 2011–2013. *Nicotine & Tobacco Research*, 17(2), 228–235. <https://doi.org/10.1093/ntr/ntu166>.
- Cantrell, J., Hair, E. C., Smith, A., Bennett, M., Rath, J. M., Thomas, R. K., ... Vallone, D. (2018). Recruiting and retaining youth and young adults: Challenges and opportunities in survey research for tobacco control. *Tobacco Control*, 27, 147–154.
- Centers for Disease Control and Prevention (2018). Smoking & tobacco use: Tobacco-related disparities. <https://www.cdc.gov/tobacco/disparities/index.htm>, Accessed date: 13 April 2018.
- Cole, A. G., Kennedy, R., Chaurasia, A., & Leithdale, S. T. (2017, March). Identifying students susceptible to using tobacco products and e-cigarettes: An evaluation of current measures. Poster presented at the 2017 Society for Research on Nicotine and Tobacco Annual Meeting, Florence, Italy.
- Delk, J., Harrell, M. B., Fakhouri, T. H. I., Muir, K. A., & Perry, C. L. (2017). Implementation of a computerized tablet-survey in an adolescent large-scale, school-based study. *Journal of School Health*, 87(7), 506–512. <https://doi.org/10.1111/josh.12521>.
- Duke, J. C., Lee, Y. O., Kim, A. E., Watson, K. A., Arnold, K. Y., Nonnemaker, J. M., & Porter, L. (2014). Exposure to electronic cigarette television advertisements among youth and young adults. *Pediatrics*, 134(1), e29–e36. <https://doi.org/10.1542/peds.2014-0269>.
- Fulmer, E. B., Neilands, T. B., Dube, S. R., Kuiper, N. M., Arrazola, R. A., & Glantz, S. A. (2015). Protobacco media exposure and youth susceptibility to smoking cigarettes, cigarette experimentation, and current tobacco use among U.S. youth. *PLoS One*, 10(8), e0134734. <https://doi.org/10.1371/journal.pone.0134734>.
- Gore, S., Aseltine, R. H., Jr., & Colten, M. E. (1992). Social structure, life stress, and depressive symptoms in a high school age population. *Journal of Health and Social Behavior*, 33(2), 97–113.
- Gritz, E. R., Prokhorov, A. V., Hudmon, K. S., Mullin Jones, M., Rosenblum, C., Chang, C. C., ... de Moor, C. (2003). Predictors of susceptibility to smoking and ever smoking: A longitudinal study in a triethnic sample of adolescents. *Nicotine & Tobacco Research*, 5(4), 493–506.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>.
- Hyland, A., Ambrose, B. K., Conway, K. P., Borek, N., Lambert, E., Carusi, C., ... Compton, W. M. (2017). Design and methods of the population assessment of tobacco and health (PATH) study. *Tobacco Control*, 26(4), 371–378. <https://doi.org/10.1136/tobaccocontrol-2016-052934>.
- Jackson, C. (1998). Cognitive susceptibility to smoking and initiation of smoking during childhood: A longitudinal study. *Preventive Medicine*, 27(1), 129–134. <https://doi.org/10.1006/pmed.1997.0255>.
- Jackson, C., & Dickinson, D. (2004). Cigarette consumption during childhood and persistence of smoking through adolescence. *Archives of Pediatrics & Adolescent Medicine*, 158(11), 1050–1056. <https://doi.org/10.1001/archpedi.158.11.1050>.
- Kong, G., Morean, M. E., Cavallo, D. A., Camenga, D. R., & Krishnan-Sarin, S. (2015). Reasons for electronic cigarette experimentation and discontinuation among adolescents and young adults. *Nicotine & Tobacco Research*, 17(7), 847–854. <https://doi.org/10.1093/ntr/ntu257>.
- Krogstad, J. M. (2014). *With fewer new arrivals census lowers hispanic population projections*. Washington, D.C.: Pew Research Center.
- Lechner, W. V., Murphy, C. M., Colby, S. M., Janssen, T., Rogers, M. L., & Jackson, K. M. (2018). Cognitive risk factors of electronic and combustible cigarette use in adolescents. *Addictive Behaviors*, 82, 182–188. <https://doi.org/10.1016/j.addbeh.2018.03.006>.
- Lipkus, I. M., Reboussin, B. A., Wolfson, M., & Sutfin, E. L. (2015). Assessing and predicting susceptibility to waterpipe tobacco use among college students. *Nicotine & Tobacco Research*, 17(9), 1120–1125. <https://doi.org/10.1093/ntr/ntu336>.
- Mantey, D. S., Cooper, M. R., Clendennen, S. L., Pasch, K. E., & Perry, C. L. (2016). E-cigarette marketing exposure is associated with e-cigarette use among U.S. youth. *Journal of Adolescent Health*, 58(6), 686–690. <https://doi.org/10.1016/j.jadohealth.2016.03.003>.
- Margolis, K. A., Nguyen, A. B., Slavik, W. I., & King, B. A. (2016). E-cigarette curiosity among U.S. middle and high school students: Findings from the 2014 National Youth Tobacco Survey. *Preventive Medicine*, 89, 1–6. <https://doi.org/10.1016/j.pymed.2016.05.001>.
- Meshack, A. F., Hu, S., Pallonen, U. E., McAlister, A. L., Gottlieb, N., & Huang, P. (2004). Texas Tobacco Prevention Pilot Initiative: Processes and effects. *Health Education Research*, 19(6), 657–668. <https://doi.org/10.1093/her/cyg088>.
- Nodora, J., Hartman, S. J., Strong, D. R., Messer, K., Vera, L. E., White, M. M., ... Pierce, J. P. (2014). Curiosity predicts smoking experimentation independent of susceptibility in a U.S. national sample. *Addictive Behaviors*, 39(12), 1695–1700. <https://doi.org/10.1016/j.addbeh.2014.06.002>.
- Patrick, M. E., Miech, R. A., Carlier, C., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (2016). Self-reported reasons for vaping among 8th, 10th, and 12th graders in the US: Nationally-representative results. *Drug and Alcohol Dependence*, 165, 275–278. <https://doi.org/10.1016/j.drugalcdep.2016.05.017>.
- Patten, E. (2016). *The nation's Latino population is defined by its youth*. Washington, D.C.: Pew Research Center.
- Pérez, A., Harrell, M. B., Malkani, R. L., Jackson, C. D., Delk, J., Allotey, P. A., ... Perry, C. L. (2017). Texas Adolescent Tobacco and Marketing Surveillance system's design. *Tobacco Regulatory Science*, 3(2), 151–167. <https://doi.org/10.18001/TRS.3.2.3>.
- Pierce, J. P., Choi, W. S., Gilpin, E. A., Farkas, A. J., & Merritt, R. K. (1996). Validation of susceptibility as a predictor of which adolescents take up smoking in the United States. *Health Psychology*, 15(5), 355–361.
- Pierce, J. P., Distefan, J. M., Kaplan, R. M., & Gilpin, E. A. (2005). The role of curiosity in smoking initiation. *Addictive Behaviors*, 30(4), 685–696. <https://doi.org/10.1016/j.addbeh.2004.08.014>.
- Pierce, J. P., Sargent, J. D., White, M. M., Borek, N., Portnoy, D. B., Green, V. R., ... Messer, K. (2017). Receptivity to tobacco advertising and susceptibility to tobacco products. *Pediatrics*, 139(6), e20163353. <https://doi.org/10.1542/peds.2016.3353>.
- Romero, A. J., Cuellar, L., & Roberts, R. E. (2000). Ethnocultural variables and attitudes toward cultural socialization of children. *Journal of Community Psychology*, 28(1), 79–89.
- Singh, T., Arrazola, R. A., Corey, C. G., Husten, C. G., Neff, L. J., Homa, D. M., & King, B. A. (2017). Tobacco use among middle and high school students—United States, 2011–2015. *MMWR. Morbidity and Mortality Weekly Report*, 65(14), 361–367. <https://doi.org/10.15585/mmwr.mm6514a1>.
- Spelman, A. R., Spitz, M. R., Kelder, S. H., Prokhorov, A. V., Bondy, M. L., Frankowski, R. F., & Wilkinson, A. V. (2009). Cognitive susceptibility to smoking: Two paths to experimenting among Mexican origin youth. *Cancer Epidemiology, Biomarkers & Prevention*, 18(12), 3459–3467. <https://doi.org/10.1158/1055-9965.EPI.09.0765>.
- Springer, A. E., Selwyn, B. J., & Kelder, S. H. (2006). A descriptive study of youth risk behavior in urban and rural secondary school students in El Salvador. *BMC International Health and Human Rights*, 6, 3. <https://doi.org/10.1186/1472-698X-6-3>.
- Strong, D. R., Hartman, S. J., Nodora, J., Messer, K., James, L., White, M., ... Pierce, J. (2015). Predictive validity of the expanded susceptibility to smoke index. *Nicotine & Tobacco Research*, 17(7), 862–869. <https://doi.org/10.1093/ntr/ntu254>.
- Trinidad, D. R., Pierce, J. P., Sargent, J. D., White, M. M., Strong, D. R., Portnoy, D. B., ... Messer, K. (2017). Susceptibility to tobacco product use among youth in wave 1 of the population assessment of tobacco and health (PATH) study. *Preventive Medicine*, 101, 8–14. <https://doi.org/10.1016/j.pymed.2017.05.010>.
- U.S. Department of Health and Human Services (2016). *E-cigarette use among youth and young adults. A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
- Unger, J. B., Johnson, C. A., Stoddard, J. L., Nezami, E., & Chou, C. P. (1997). Identification of adolescents at risk for smoking initiation: Validation of a measure of susceptibility. *Addictive Behaviors*, 22(1), 81–91.
- Yu, C. (2002). *Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes* (Doctoral dissertation) Los Angeles: University of California.



## Martinez, Ruben

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**From:** Alisha Lopez  
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To Whom It May Concern with the City of Pasadena,

Please see below for my written public comment for tonight's city council meeting:

Dear Honorable Mayor and City Council members,

My name is Alisha Lopez and I am the Director of Tobacco Prevention Programs at Day One, a local Pasadena non-profit organization with over 30 years of experience building vibrant, healthy cities by advancing public health, empowering youth and igniting change throughout the San Gabriel Valley. Day One is also a long-time member of the Pasadena Tobacco Prevention Coalition.

I am writing to applaud your leadership for consideration of a Tobacco Flavor Ban this evening, per item 11 on the agenda, because implementation will no doubt save countless lives. 90% of adult cigarette smokers begin smoking before the age of 18 and youth are more likely than adults to initiate tobacco product use with flavored tobacco products. With misleading and targeted tobacco industry marketing of flavored tobacco products to youth and the wide-spread availability of products in appealing, youth-friendly flavors like strawberry and cotton candy, strong local policies that restrict sales of flavored tobacco products are urgently needed. The City of Pasadena has already done so much to protect our youth from easy access to tobacco products and exposure to secondhand smoke in outdoor areas and in multi-unit housing--this additional provision will further protect Pasadena youth from beginning a lifelong addiction to tobacco.

As of December 2020, at least 300 local communities in the U.S. currently prohibit the sale of flavored tobacco products, and at least 110 of which prohibit the sale of menthol cigarettes in addition to other flavored products. So, you are not alone!

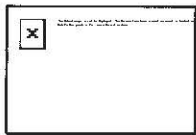
Again, I applaud your leadership and look forward to an even safer and healthier Pasadena for our youth and future generations.

Thank you for your time and consideration.

Alisha Lopez

10/25/2021  
Item 11





**Alisha Lopez | Director of Tobacco Programs**

**Pronouns:** She, Her, Hers

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Day One builds vibrant, healthy cities by advancing public health, empowering youth, and igniting change

**DO Stay Home DO Stay Healthy DO Stay Connected**