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### Permalink

<https://escholarship.org/uc/item/03512341>

### Journal

Journal of Adolescent Health, 61(3)

### ISSN

1054-139X

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### Publication Date

2017-09-01

### DOI

10.1016/j.jadohealth.2017.04.012

Peer reviewed



# HHS Public Access

Author manuscript

*J Adolesc Health*. Author manuscript; available in PMC 2018 September 01.

Published in final edited form as:

*J Adolesc Health*. 2017 September ; 61(3): 385–388. doi:10.1016/j.jadohealth.2017.04.012.

## Access to tobacco among California high school students: the role of family members, peers and retail venues

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### Abstract

**Purpose**—To determine from whom and where adolescents obtained tobacco, including cigarettes, e-cigarettes, and hookah.

**Methods**—California adolescents (N=772; 63.19% female; mean age = 16.13 years, SD = 1.61; 26.44% White, 22.12% Asian/Pacific Islander, 36.65% Hispanic, and 14.79% other) were surveyed about their access to different tobacco products.

**Results**—Adolescents were significantly more likely to obtain tobacco from peers (54.9%) than family members or direct purchasing ( $p < .001$ ). Smoke shops were the most common purchase location across products (44.3%), with adolescents significantly more likely to purchase hookah and e-cigarettes from smoke shops than gas stations, liquor stores or drug stores ( $p < .02$ ).

**Conclusions**—The effective characterization of tobacco access patterns is critical to the development of comprehensive tobacco control. By demonstrating peers and smoke shops as the primary social and retail outlets, this study identifies targets for the optimization of regulation and messaging aimed at reducing adolescents' access to tobacco.

### Keywords

adolescents/youth; cigarettes; e-cigarettes; hookah; public health; access; purchasing; tobacco control

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## INTRODUCTION

Large-scale national studies in the United States have shown a decline in cigarette smoking prevalence among adolescents and young adults (AYAs) (1–5). However, total tobacco product consumption has increased, largely due to the growing popularity of e-cigarettes and hookah (1–5). Despite longstanding laws banning the sale of tobacco products to adolescents under the age of 18, a 2015 study showed 66% of 10<sup>th</sup> graders identified cigarettes as “easy to obtain;” a notable decline from 91% in 1996 (4). Coincident with the decline in perceived ease of obtaining cigarettes, recent research has shown that adolescents are increasingly identifying peers as the primary source of cigarettes (1,2,5).

Most research on where and how youth access tobacco has focused on cigarettes, leaving a paucity of data on how and where adolescents obtain e-cigarettes, hookah, pipe tobacco, chew/dip and cigars. Efforts to understand adolescents’ access across tobacco products and retail venues represent an important means to inform a more comprehensive approach to tobacco control regulation. This study examines AYAs’ access to cigarettes, e-cigarettes, hookah, chew, cigars, and pipes, including from whom and where these products were obtained.

## METHODS

### Participants

Participants were recruited directly from 9th and 12th grade classrooms from eight large and diverse California high schools to participate in an ongoing longitudinal study of tobacco access, perceptions, social norms, marketing, and tobacco use (6). A total of 1299 participants were enrolled and provided assent and parental consent (for those under age 18); 405 were disqualified due to missing information. A total of 772 participants (59.43%) completed the survey. Participant demographics were as follows: N=772; 63.19% female; mean age = 16.13 years, SD = 1.61; 26.44% White, 22.12% Asian/Pacific Islander, 36.65% Hispanic, and 14.79% other. Enrolled participants completed an online survey administered through Qualtrics (Qualtrics Labs; Provo, UT) to assess their tobacco product usage and access patterns. This study was approved by the Stanford University IRB.

### Measures

Participants were asked whether they had ever used hookah, e-cigarettes, cigarettes, pipe tobacco, cigars, and chew/dip. Those who self-reported having ever used any of the tobacco products were asked from whom and where they obtained these products (Table 1).

### Data Analysis

Descriptive analyses were performed to determine product usage and purchasing patterns (Table 1), in total and separately by age group (under age 18 and 18 and over). Logistic regression models using GEE to adjust for clustering by school were estimated and tested with Tukey-Kramer adjustment for multiple comparisons to compare access patterns (Table 2). Due to limited power, subgroup analyses comparing access patterns among early high

school (aged 13–15) and late high school (aged 16–19) were limited to descriptive statistics (Table 1).

## RESULTS

The most common tobacco products used were hookah, e-cigarettes, and cigarettes, representing 32.7%, 28.7% and 19.2% of total users respectively (Table 1). For both minors and those over age 18, peers represented the main source of tobacco products (54.9%), with adolescents significantly more likely to obtain hookah, e-cigarettes and cigarettes from a friend than any of the other sources addressed (Table 2).

With respect to retail outlets, for those over and under age 18, smoke shops were the most common location of purchase, representing 44.3% of all respondents (Table 1). Participants were significantly more likely to obtain e-cigarettes and hookah from a “smoke shop” than any other retail outlet (Table 2). For all other products assessed, there was no significant difference in purchase patterns between intrapersonal sources or retail outlets.

## DISCUSSION

This study extends past research on AYA’s access to cigarettes to an examination of from whom and where they obtain hookah, e-cigarettes, cigarettes, pipe tobacco, cigars, and chew/dip. Consistent with prior national studies (1,2,5), this study demonstrates that most AYAs obtain tobacco products from peers rather than from others or purchasing it themselves.

With 20% of high school students being over age 18, tobacco access from peers among those under age 18 in our study may be a function of these younger adolescents having members in their peer network able to legally purchase tobacco products (8). However, this study also showed that 9.3% of participants under the age of 18 reported purchasing tobacco products themselves, a finding similar to the 9.6% violation rate noted in the 2013 Synar report (9). Thus, despite legislation banning the sale to minors, AYAs continue to directly purchase tobacco products at alarming rates.

For both those under and over age 18, the most common venue for direct purchase of e-cigarettes and hookah was smoke shops. While the increased likelihood of purchasing hookah and e-cigarettes at smoke shops may be simply a reflection of the limited availability of these products in other venues, it may represent an important finding when directing tobacco control legislation and enforcement policy to counteract the increasing prevalence of e-cigarette and hookah usage among AYA.

The recent California law, enacted after this study was conducted, that raised the legal purchase age of tobacco to 21 will reduce the likelihood that AYAs will have a peer in their friend group able to legally purchase tobacco (1). This and similar legislation have the potential to make a profound impact on sharing tobacco, the predominant means of AYA tobacco product access. However, the success of this policy relies upon strict enforcement of age restrictions, a policy currently sub-optimally implemented as indicated by the Synar report violation rate (9). Thus, these findings highlight the importance of both stricter

enforcement of purchase laws and targeted messaging campaigns addressing sharing amongst peers in comprehensive tobacco control policy. Similar large-scale investigations comparing jurisdictions with legal age of purchasing of 21 versus 18 could help to further delineate purchase patterns and any potential impact of increasing the age of purchase to 21 on AYA tobacco product access.

Being a cross-section of California teens, an area with lower smoking prevalence and more aggressive tobacco control policies, the generalizability of the results to other US states and international populations may be limited. Further, it is possible that only those highly motivated to participate were enrolled, introducing a potential participant bias.

In conclusion, the effective characterization of access patterns across tobacco products is critical to the development of effective comprehensive tobacco control measures. The findings suggest that tobacco control policies aimed at reducing tobacco usage should focus in part on addressing peer influences, enforcing current policies to limit access and tailoring messaging campaigns to counteract peer sharing. Raising the age of purchase to 21, together with focused enforcement policy with particular emphasis placed on smoke-shops, represents an important step towards reducing access across all tobacco products as well as their usage amongst AYAs.

## Acknowledgments

Research reported in this paper was supported by grant number 1P50CA180890 from the National Cancer Institute and the Food and Drug Administration Center for Tobacco Products. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration. We would like to thank the teachers and students who participated in this study.

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### IMPLICATIONS AND CONTRIBUTIONS

Adolescents' access to cigarettes has been well documented; however, less is known about access to other tobacco products including e-cigarettes and hookah. This study outlines access patterns across multiple products to inform a more precise approach to messaging, regulation and enforcement aimed at reducing access to tobacco among adolescents.

TABLE 1

Participant product usage, and from whom and where they obtained these products; by age group.

Product Usage	Total N (%)		Hookah		E-Cigarettes		Cigarettes		Cigars		Pipe Tobacco		Chew or Dip	
	<18	18	<18	18	<18	18	<18	18	<18	18	<18	18	<18	18
<b>Product Usage</b>														
Ever Used (N=499)	321 (64.3)	178 (35.7)	107 (21.4)	56 (11.8)	94 (18.9)	49 (9.8)	65 (13.0)	31 (6.2)	29 (5.8)	18 (3.6)	13 (2.6)	8 (1.6)	11 (2.2)	
<b>From whom did you obtain the product the last time you used it? (N)</b>														
Friend (N=253)	173 (68.4)	80 (31.6)	66 (26.1)	31 (12.3)	49 (19.4)	16 (6.3)	32 (12.6)	13 (5.1)	13 (5.1)	9 (3.6)	8 (3.2)	4 (1.6)	3 (1.2)	
Self (N=89)	30 (33.7)	59 (66.3)	10 (11.2)	15 (16.9)	12 (13.5)	19 (21.3)	4 (4.5)	11 (12.4)	2 (2.2)	5 (5.6)	1 (1.1)	4 (4.5)	1 (1.1)	5 (5.6)
Family (N=46)	34 (73.9)	12 (26.1)	16 (34.8)	6 (13.0)	12 (26.1)	3 (6.5)	1 (2.2)	1 (2.2)	4 (8.7)	2 (4.3)	0 (0)	0 (0)	0 (0)	0 (0)
Bummed (N=42)	37 (88.1)	5 (11.9)	14 (33.3)	0 (0)	10 (23.8)	4 (9.5)	7 (16.7)	1 (2.4)	2 (4.8)	0 (0)	3 (7.1)	0 (0)	1 (2.4)	0 (0)
Took (N=31)	22 (71.0)	9 (29.0)	1 (3.2)	1 (3.2)	5 (16.1)	3 (9.7)	13 (41.9)	3 (9.7)	1 (3.2)	1 (3.2)	0 (0)	1 (3.2)	0 (0)	1 (3.2)
<b>From where did you obtain the product the last time you used it? (N)</b>														
Smoke Shop (N=82)	34 (41.5)	48 (58.5)	15 (18.3)	19 (23.2)	15 (18.3)	16 (19.5)	2 (2.4)	2 (2.4)	2 (2.4)	7 (8.5)	0 (0)	4 (4.9)	0 (0)	0 (0)
Gas Station (N=34)	14 (41.2)	20 (58.9)	2 (5.9)	2 (5.9)	3 (8.8)	2 (5.9)	3 (8.8)	9 (26.5)	4 (11.8)	2 (5.9)	0 (0)	0 (0)	2 (5.9)	5 (14.7)
Liquor Store (N=30)	20 (66.7)	10 (33.3)	7 (23.3)	2 (6.7)	3 (10.0)	1 (3.3)	7 (23.3)	4 (13.3)	3 (10.0)	1 (3.3)	0 (0)	0 (0)	0 (0)	2 (6.7)
Drug Store (N=18)	14 (77.8)	4 (22.2)	2 (11.1)	1 (5.6)	4 (22.2)	1 (5.6)	4 (22.2)	1 (5.6)	2 (11.1)	0 (0)	1 (5.6)	1 (5.6)	1 (5.6)	0 (0)
Internet (N=21)	15 (71.4)	6 (28.6)	6 (28.6)	1 (4.8)	8 (38.1)	5 (23.8)	0 (0)	0 (0)	0 (0)	0 (0)	1 (4.8)	0 (0)	0 (0)	0 (0)

Note: Due to low response rate, the responses “a friend gave them to me” and “a friend bought them for me” were collapsed into the variable “obtained from a friend,” while “someone in my family bought them for me with my money” and “someone in my family gave them to me” were collapsed to “obtained from a family member”.



Comparison of from whom and from where adolescents are obtaining tobacco products

**TABLE 2**

	Hookah		E-Cigarettes		Cigarettes		Cigars		Pipe Tobacco		Chew or Dip	
	OR	p	OR	p	OR	p	OR	p	OR	p	OR	p
<b>From whom did you obtain the product the last time you used it?</b>												
Friend	1	-	1	-	1	-	1	-	1	-	1	-
Self	0.258	<0.001	0.477	0.017	0.333	0.038	0.318	0.042	0.294	0.055	0.857	0.828
Family	0.227	<0.001	0.231	<0.001	0.044	<0.001	0.273	0.108	0.059	0.043	-	-
Bummed	0.144	<0.001	0.215	<0.001	0.178	<0.001	0.091	0.012	0.176	0.066	0.143	0.108
Took	0.021	<0.001	0.123	0.008	0.356	0.006	0.091	0.007	0.059	0.028	0.286	0.234
<b>From where did you obtain the products the last time you used it?</b>												
Smoke Shop	1	-	1	-	1	-	1	-	1	-	1	-
Gas Station	0.118	<0.001	0.161	0.005	3	0.225	0.667	0.479	-	-	1	-
Liquor Store	0.265	0.015	0.129	0.015	2.75	0.273	0.444	0.329	-	-	0.286	0.19
Drug Store	0.088	0.001	0.161	0.018	1.25	0.779	0.222	0.116	0.5	0.569	0.143	0.167
Internet	0.206	0.003	0.419	0.126	-	-	-	-	0.25	0.421	-	-

Note: Blank cells indicate no participants reporting purchasing from those locations.