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Sources of Awareness of JUUL E-cigarettes in 2 Surveys of US Adults

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Abstract

Objectives: Since its introduction in 2015, JUUL e-cigarettes gained >60% of the United States 2018 retail market share among branded e-cigarette companies. The sources through which consumers learn about JUUL e-cigarettes is not known.

Methods: We assessed the sources of awareness about JUUL through 2 cross-sectional surveys of US adults (Survey 1: 502 18–24 year-olds; Survey 2: 803 smokers age 18+). Primary measures were awareness of JUUL and sources through which participants learned about JUUL.

Results: Awareness of JUUL was greater among smokers and younger adults (age < 30). Common sources of awareness were advertisements, news and word-of-mouth.

Conclusions: This study is the first to identify sources through which never, non-current ever, and current smokers learned about JUUL e-cigarettes. Regulatory efforts and educational interventions may opt to focus on these channels.

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Conflict of Interest Statement

The authors have no financial disclosures to report.

Keywords

electronic cigarettes (e-cigarettes); communication; information seeking; advertising; marketing; tobacco control

INTRODUCTION

The use of JUUL electronic cigarettes (e-cigarettes) has grown substantially since their introduction in the United States (US) e-cigarette market in 2015. By the first quarter of 2018, JUUL had captured more than 60% of the retail market share.¹ No other e-cigarette on the market has seen such a rapid rise in popularity, necessitating a need to understand how JUUL accomplished such growth. Among US young adults aged 18–24 years, 29% were aware of JUUL e-cigarettes and 12% reported ever using JUUL e-cigarettes.^{2,3} Evidence suggests that e-cigarettes are considerably less harmful than combustible cigarettes, and could potentially help smokers quit smoking cigarettes.^{4,5} However, e-cigarettes are not completely risk-free and can result in nicotine dependence, negative effects on brain development among young people, and potential transition to combustible tobacco use.⁴

In April 2018, the Food and Drug Administration (FDA), a regulatory agency that has the authority to regulate tobacco products (including e-cigarettes) in the US, issued a letter requesting documents from JUUL Labs, Inc. (maker of JUUL e-cigarettes)⁶ on their marketing practices, including their modes of advertising and promotion. Yet, to date, the leading sources of information about JUUL e-cigarettes among young adults are not known. Only one study noted that JUUL Labs, Inc. favors online and social media over traditional forms of marketing.⁷ Thus, although there has been research documenting e-cigarette marketing practices and consumers' sources of information about e-cigarettes,^{8–11} there are no studies that have specifically examined JUUL.

Timely knowledge of these sources of information about JUUL e-cigarettes can help provide information regarding how JUUL garnered such popularity in the US in such a short period of time. Moreover, understanding how individuals learned about JUUL can inform e-cigarette marketing regulations and interventions to educate consumers about the health risks of JUUL. To address this need, the current study leveraged 2 existing cross-sectional surveys to assess the prevalence and sources of awareness of JUUL products among young adult current, non-current ever, and never cigarette smokers aged 18–24 (Survey 1), and compare the prevalence of JUUL awareness and sources of information about JUUL between younger adult (age 18–30) and older adult (age 31 and older) cigarette smokers (Survey 2).

METHODS

Study populations

Survey 1.—In April 2018, we recruited 502 18–24 year-olds through Amazon Mechanical Turk (AMT), a platform increasingly used by researchers for data collection.^{12–14} Participants must reside in the US, be 18–24 years old, and have provided their smoking status (never, non-current ever, or current smoker). We additionally imposed 2 AMT-specific inclusion criteria: that participants have completed at least 100 AMT tasks previously, and

have a 90% approval rating on AMT. These thresholds are commonly used in research conducted on AMT and help ensure data quality.¹⁵ Participants who were interested in participating clicked a link which took them to an information sheet about the study. After reading the information sheet, participants could click a button indicating their consent to participate in the study. Individuals who agreed to participate in the study completed a 15-minute online survey on tobacco use and were compensated \$2. Of the 502 participants who initiated the survey, 488 provided complete and valid response sets, resulting in an analytic sample of 488.

Survey 2.—In March 2018, we recruited 803 participants from Survey Sampling International’s (SSI) online panel. Participants must reside in the US, be 18 years or older, have smoked 100 cigarettes in their lifetime, and currently smoke some days or every day in the past 30 days. Based on the baseline demographic information and smoking status, SSI sends targeted email invitations to potentially eligible panelists. Participants were consented online and completed a 20-minute survey on tobacco beliefs and use intentions. Of 1182 panelists who began the survey, 913 met the eligibility criteria and 803 (88%) completed the survey. Participants were rewarded points by SSI for completing the survey that can be exchanged for cash per SSI policies.

Measures

Participants of both surveys reported sociodemographic characteristics and smoking behavior (see Table 1). Questions about JUUL appeared in both surveys. Awareness and use of JUUL e-cigarettes was assessed by asking “Have you ever used a JUUL, even just one time?” with the responses: “I have not heard of JUUL before today;” “I have heard of JUUL but I have never used it before;” “I have used JUUL before but more than 30 days ago;” and “I have used JUUL in the last 30 days.” Participants who had heard of JUUL or who had previously used a JUUL were considered to be aware of JUUL products and were asked about the sources of information about JUUL by selecting the ways that they heard about JUUL from a list (see Table 2).

Statistical Analyses

Data were analyzed in 2018 using Stata Version 14. Descriptive statistics were used to report participant characteristics, overall and by sub-group. Logistic regressions were conducted to further investigate differences in JUUL awareness by smoking status (Survey 1) and age group (Survey 2). Potential covariates were sex, race/ethnicity, education level (for both surveys) as well as age, household income, employment status, marital status, smoking status and nicotine dependence (for Survey 2). Covariates were selected using a change-in-estimate approach, including those variables that resulted in a 10% change. Missing data were treated using listwise deletion.

RESULTS

Table 1 presents characteristics of each sample. About half the participants in each survey were aware of JUUL. About 17% (16.6%) of young adults had tried JUUL, and 17.9% of adult smokers had tried JUUL.

[Table 2 presents differences in awareness of JUUL and source of awareness by smoking status (Survey 1) and age (Survey 2). In Survey 1, young adult current smokers were more aware of JUUL than non-current ever and never smokers. Among current smokers who were aware of JUUL, internet ads for JUUL, word-of-mouth from friends and family and JUUL's website or social media accounts were the most common sources of awareness. Among non-current ever smokers and never smokers, word-of-mouth from family and friends and internet ads for JUUL were the most common sources of awareness. Current smokers were more likely than non-current ever smokers to be aware of JUUL through JUUL's website or social media account and less likely to learn of JUUL through word-of-mouth.

In Survey 2, young adult smokers were more aware of JUUL than older adult smokers. Nearly two-thirds of young adult smokers had heard of JUUL, compared to about one-third of older adult smokers. Among young adult smokers who were aware of JUUL, the most common sources of awareness were internet ads for JUUL, print media ads and JUUL's website or social media accounts. Among older adult smokers, the most common sources of awareness were internet ads for JUUL, news stories and word-of-mouth from family and friends and print media. Compared to older adults, young adults were more likely to become aware of JUUL through JUUL outdoor ads and less likely to become aware of JUUL through news stories.

Several covariates were associated with JUUL awareness. In Survey 1, individuals with a college degree or more were more likely than those to learn about JUUL through print media (aOR [95% CI]=8.25 [1.06–64.22]) than those with a high school degree or less, Hispanic young adults were more likely to learn through JUUL sponsored events (aOR [95% CI]=4.47 [1.71–11.70]) and JUUL's website or social media account (aOR [95% CI]=5.30 [2.20–12.74]) than non-Hispanic whites. In Survey 2, younger adults (ages 18–30) were more likely to learn about JUUL through online banner and social media (aOR [95% CI]=1.66 [1.03–2.69]) and less likely to learn about JUUL through TV and radio (aOR [95% CI]=0.18 [0.08, 0.41]) than older adults (ages 31 and older). Additionally, men were more likely to learn about JUUL through print magazine or newspaper (aOR [95% CI]=2.35 [1.36–4.04]), mail or email (aOR [95% CI]=3.50 [1.68, 7.28]), and JUUL sponsored events (aOR [95% CI]=3.37 [1.62, 7.03]) than women.

DISCUSSION

Internet ads for JUUL, and JUUL's website and social media accounts were common sources of awareness about JUUL among individuals in our US-based samples. This aligns with prior work documenting JUUL's use of online and social media, as opposed to traditional media, to market its product.⁷ Given the reach of these sources, it is important for regulators to ensure JUUL does not attract nonsmokers through these sources. Additionally, while some work has examined conversations about JUUL via social media,^{16,17} less is known about JUUL's sponsored marketing; research should characterize the nature of this marketing.

JUUL claims that the product is intended to be a "switching product" (ie, switching from combustible cigarettes). However, Survey 2 results found that, compared to young adult

smokers, smokers over the age of 31 – a group with more frequent quit attempts - have lower levels of awareness of JUUL. These older smokers are more likely to learn about JUUL through news stories, which to date have largely focused on the problematic aspects of JUUL's popularity with youth. Thus, there may be a potential mismatch between those who are aware of JUUL and those smokers who are ready to quit smoking.

Limitations

Although previous work has found that for correlational analyses, AMT produces results similar to data collected through conventional recruitment modes,¹⁸ the population of AMT users may not represent the general US population.^{18,19} The study population in Survey 2 was not nationally representative. Only current smokers were recruited in Survey 2 and we were not able to assess awareness and sources of JUUL information among never and former smokers for comparison with Survey 1. Additionally, in some sub-groups (ie, by smoking status or age) some sources of information were used by few individuals resulting in small cell sizes and large confidence intervals. This study could be replicated with a larger sample size. Additionally, given JUUL's popularity with youth, research should investigate how those under the age of 18 learned about the product. Strengths of this study include its ability to rapidly collect data regarding JUUL awareness in young adults for whom e-cigarette use is of particular interest.

Conclusion

This study is the first to identify the sources through which current, non-current ever, and never smokers learned about JUUL e-cigarettes. This study's initial evidence regarding common information sources about JUUL can help researchers and regulators begin to understand how JUUL became so popular so quickly. Much media attention surrounding JUUL has focused on JUUL use among youth, and in the US there are currently no restrictions on e-cigarette advertising to youth. However, adults are also an important population to consider for tobacco regulation. Young adults, in particular, are an important population for regulatory efforts, as recent work has shown this population to be more likely than youth to initiate new tobacco product use, including e-cigarettes.¹⁶ While evidence indicates that e-cigarettes are significantly less harmful than combustible tobacco and may serve as harm reduction devices among smokers,^{4,5} it is also important to ensure that JUUL is not attracting adult non-smokers to its product, since e-cigarettes are not completely harm-free.

In the US, the FDA has the authority to regulate tobacco products and e-cigarettes were deemed to be tobacco products in 2016. The FDA should consider focusing its regulatory efforts on the channels identified as most popular in this study. FDA has expanded its tobacco education campaigns to now include e-cigarettes. Efforts to educate consumers about JUUL may consider adopting these channels to disseminate public health messages about the potential harms of e-cigarette use, specifically JUUL e-cigarette use.

This study's findings add to a small body of knowledge regarding JUUL use in the US and, to our knowledge, is the only study to date that examines JUUL awareness in young adults and adults, and by smoking status. Understanding JUUL awareness in these important

populations can help inform policies and interventions that maximize public health benefit and minimize public health harm of this product.

Human Subjects Statement

Survey 1 was approved by Johns Hopkins Bloomberg School of Public Health Institutional Review Board IRB, IRB00007946). Survey 2 was approved by the Harvard University TH Chan School of Public Health IRB (IRB18–0467). Study procedures meet the ethical standard outlines in Helsinki Declaration of 1975 as revised in 2000. All participants provided informed consent to participate in the study.

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References

1. Nielsen Total US xAOC/Convenience Database & Wells Fargo Securities, LLC. Wells Fargo Securities, Nielsen: Tobacco 'all channel' Data 5/19. 5 29, 2018.
2. Vogel EA, Ramo DE, Rubinstein ML. Prevalence and correlates of adolescents' e-cigarette use frequency and dependence. *Drug Alcohol Depend.* 2018;188:109–112. [PubMed: 29763848]
3. Willett JG, Bennett M, Hair EC, et al. Recognition, use and perceptions of JUUL among youth and young adults. *Tob Control.* 2018; pii: tobaccocontrol-2018–054273 [Epub ahead of print].
4. McNeill A, Brose L, Calder R, et al. E-cigarettes: An Evidence Update. *Public Health England* 2015.
5. National Academies of Sciences, Engineering, and Medicine. *Public Health Consequences of E-cigarettes.* National Academies Press 2018.
6. Submission Tracking Number (STN): RD0000476. FDA letter to JUUL; <https://www.fda.gov/downloads/TobaccoProducts/Labeling/RulesRegulationsGuidance/UCM605490.pdf>.
7. Huang J, Duan Z, Kwok J, et al. Vaping versus JUULing: How the extraordinary growth and marketing of JUUL transformed the US retail e-cigarette market. *Tob Control.* 2018.
8. Collins L, Glasser AM, Abudayyeh H, et al. E-cigarette marketing and communication: How E-cigarette companies market E-cigarettes and the public engages with E-cigarette information. *Nicotine Tobacco Res.* 2018; pii: ntx284 [Epub ahead of print].
9. Padon AA, Maloney EK, Cappella JN. Youth-targeted e-cigarette marketing in the US. *Tob Regul Sci.* 2017;3(1):95–101. [PubMed: 28083545]
10. Tan AS, Alexander GL, Mazor K, et al. Exploring prevalence of discussions of e-cigarettes use during tobacco cessation counseling and smokers' understanding of e-cigarette use. *J Patient Cent Res Rev.* 2017;4(3):167.
11. Yang Q, Liu J, Lochbuehler K, Hornik R. Does seeking e-cigarette information lead to vaping? evidence from a national longitudinal survey of youth and young adults. *Health Commun.* 2017:1–8.
12. Brabham DC, Ribisl KM, Kirchner TR, Bernhardt JM. Crowdsourcing applications for public health. *Am J Prev Med.* 2014;46(2):179–187. [PubMed: 24439353]

13. Casler K, Bickel L, Hackett E. Separate but equal? A comparison of participants and data gathered via amazon's MTurk, social media, and face-to-face behavioral testing. *Comput Hum Behav.* 2013;29(6):2156–2160.
14. Paolacci G, Chandler J. Inside the turk: Understanding mechanical turk as a participant pool. *Curr Dir Psychol Sci.* 2014;23(3):184–188.
15. Jeong M, Zhang D, Morgan JC, et al. Similarities and differences in tobacco control research findings from convenience and probability samples. *Ann Behav Med.* 2018; kay059. 2018.
16. Allem J, Dharmपुरi L, Unger JB, Cruz TB. Characterizing JUUL-related posts on Twitter. *Drug Alcohol Depend.* 2018;190:1–5. [PubMed: 29958115]
17. Kavuluru R, Han S, Hahn EJ. On the popularity of the USB flash drive-shaped electronic cigarette Juul. *Tob Control.* 2018.
18. Kraemer JD, Strasser AA, Lindblom EN, et al. Crowdsourced data collection for public health: A comparison with nationally representative, population tobacco use data. *Prev Med.* 2017;102:93–99. [PubMed: 28694063]
19. Yank V, Agarwal S, Loftus P, et al. Crowdsourced health data: Comparability to a US national survey, 2013–2015. *Am J Public Health.* 2017;107(8):1283–1289. [PubMed: 28640681]

Table 1.

Characteristics of the study samples.

	Johns Hopkins Young Adult Study(a) (18–24 years old) N = 488	Harvard Smoker Study(b) (18+ years old) N = 803
	N (%)	N (%)
Age (Mean/SD)	22.4 (1.52)	40.4 (12.6)
Age (Years)		
18–30	488 (100%)	229 (28.5%)
31 and above	--	574 (71.5%)
Sex		
Male	287 (58.8%)	355 (44.2%)
Female	195 (40.0%)	447 (55.7%)
Another gender	4 (0.8%)	
Missing	2 (0.4%)	1 (0.1%)
Race/ethnicity		
Hispanic	67 (13.7%)	63 (7.9%)
Non-Hispanic White	328 (67.2%)	616 (76.7%)
Non-Hispanic Black	45 (9.2%)	54 (6.7%)
Non-Hispanic other	47 (9.6%)	69 (8.6%)
Missing	1 (0.2%)	1 (0.1%)
Education		
High school/vocational	65 (13.3%)	238 (29.6%)
Some college	179 (36.7%)	217 (27.0%)
College graduate or more	242 (50.0%)	347 (43.3%)
Missing	2 (0.4%)	1 (0.1%)
Employment		
Employed	--	549 (68.4%)
Other	--	254 (31.6%)
Marital Status		
Married	--	467 (58.2%)
Single	--	136 (16.9%)
Other	--	197 (24.5%)
Missing	--	3 (0.4%)
Household Income		
<\$50K	--	308 (38.4%)
\$50K or more	--	494 (61.5%)
Missing	--	1 (0.1%)
Smoking status		

	Johns Hopkins Young Adult Study(a) (18–24 years old) N = 488	Harvard Smoker Study(b) (18+ years old) N = 803
	N (%)	N (%)
Never smoker	50 (10.3%)	--
Non-current ever smoker	132 (27.1%)	--
Current non-daily smoker	180 (36.9%)	560 (69.7%)
Current daily smoker	126 (25.8%)	243 (30.3%)
Nicotine dependence(c)		
Low (score of 0–4)	--	303 (37.7%)
Medium (score of 5–6)	--	251 (31.3%)
High (score of 7–10)	--	249 (31.0%)
JUUL use and awareness		
Never heard of JUUL	240 (49.2%)	462 (57.5%)
Heard of JUUL, never used	167 (34.2%)	195 (24.3%)
Used JUUL, not in past 30 days	48 (9.8%)	65 (8.1%)
Used JUUL in past 30 days	33 (6.8%)	79 (9.8%)
Missing	0 (0.0%)	2 (0.3%)

^a Johns Hopkins Young Adult Study recruited US 18–24 year olds using Amazon Mechanical Turk during April, 2018.

^b Harvard Smoker Study recruited US adult (18 years old or older) smokers during April, 2018.

^c Assessed using the Fagerström Test for Nicotine Dependence.¹³

Table 2.

Sources of awareness by smoking status (Survey 1) and age (Survey 2).

	Johns Hopkins Young Adult Study (18–24 years old)(a)			Harvard Smoker Study (18+ years old)(b)	
	Never smokers (n = 50)	Non-current, ever smokers (n = 132)	Current smokers (n = 306)	Young Adult (18–30), Current Regular Smokers (n = 229)	Older Adult (31+), Current Regular Smokers (n = 574)
Awareness					
Aware of JUUL					
N (%)	16 (32.0%)	56 (42.4%)	176 (57.5%)	145 (63.3%)	196 (34.2%)
AOR (95% CI)	0.40 (0.21–0.78)	.58 (0.38–0.88)	Ref.	3.13 (2.26, 4.35)	Ref.
Sources of awareness					
Print media ads (magazine/newspaper)					
N (%)	2 (12.5%)	4 (7.1%)	30 (17.1%)	45 (31.0%)	40 (20.4%)
AOR (95% CI)	0.74 (0.15–3.63)	0.41 (0.13–1.26)	Ref.	1.58 (0.96, 2.62)	Ref.
Internet ad (online banner/social media)					
N (%)	6 (37.5%)	17 (30.4%)	81 (46.0%)	90 (62.1%)	90 (45.9%)
AOR (95% CI)	0.79 (0.27–2.33)	0.56 (0.29–1.07)	Ref.	1.67 (1.03, 2.69)	Ref.
Direct mail/email					
N (%)	2 (12.5%)	0 (0.0%)	32 (18.8%)	26 (17.9%)	25 (12.8%)
AOR (95% CI)	0.97 (0.20–4.79)	--	Ref.	1.29 (0.70, 2.38)	Ref.
JUUL sponsored events					
N (%)	0 (0.0%)	0 (0.0%)	26 (14.8%)	29 (20.0%)	22 (11.2%)
AOR (95% CI)	--	--	Ref.	1.72 (0.93, 3.20)	Ref.
JUUL outdoor ads					
N (%)	1 (6.3%)	0 (0.0%)	22(12.5%)	23 (15.8%)	15 (7.7%)
AOR (95% CI)	0.61 (0.07–5.18)	--	Ref.	2.27 (1.14, 4.53)	Ref.
JUUL website or social media account					
N (%)	2 (12.5%)	1 (1.8%)	38 (21.6%)	32 (22.1%)	25 (12.8%)
AOR (95% CI)	0.95 (0.19–4.83)	0.09 (0.01–0.67)	Ref.	1.73 (0.95, 3.18)	Ref.
Word-of-mouth from friends and family					
N (%)	8 (50.0%)	31 (55.4%)	67 (38.1%)	27 (18.6%)	40 (20.4%)
AOR (95% CI)	1.35 (0.48–3.85)	1.91 (1.03–3.57)	Ref.	1.11 (0.62, 1.98)	Ref.
Friends and family's social media account					
N (%)	2 (12.5%)	11 (19.6%)	32 (18.2%)	20 (13.8%)	24 (12.2%)
AOR (95% CI)	.72 (0.15–3.38)	1.25(0.57 – 2.73)	Ref.	1.22 (0.64, 2.36)	Ref.
News stories on TV/radio/online					
N (%)	4 (25.0%)	6 (10.7%)	27 (15.3%)	7 (4.8%)	45 (23.0%)
AOR (95% CI)	2.71 (0.75–9.85)	.75 (0.29 – 1.98)	Ref.	0.18 (0.08, 0.41)	Ref.

	Johns Hopkins Young Adult Study (18–24 years old)(a)			Harvard Smoker Study (18+ years old)(b)	
	Never smokers (n = 50)	Non-current, ever smokers (n = 132)	Current smokers (n = 306)	Young Adult (18–30), Current Regular Smokers (n = 229)	Older Adult (31+), Current Regular Smokers (n = 574)
At a store					
N (%)	2 (12.5%)	5 (8.9%)	20 (11.4%)	10 (6.9%)	16 (8.2%)
AOR (95% CI)	1.16 (0.24–5.62)	.87 (0.30–2.49)	Ref.	1.19 (0.49, 2.86)	Ref.

^a Johns Hopkins Young Adult Study recruited US 18–24 year olds using Amazon Mechanical Turk during April, 2018.

^b Harvard Smoker Study recruited US adult (18 years old or older) smokers during April, 2018.

Note: Analyses adjusted for all variables listed in Table 1 per study. Current smokers in Survey 1 were defined as those who currently smoked some or all days; non-current ever smokers were defined as those who had ever smoked a cigarette, but did not currently smoke; never smokers were defined as those who had never tried smoking.