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Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Blackburn, Gilbert.
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Prevalence of Cannabis Use in Electronic Cigarettes Among US Youth

Electronic cigarettes (e-cigarettes) are the most commonly used tobacco product among US youth.[1] Cannabis and other substances can be used in e-cigarettes; in 2015, approximately one-third of US middle and high school students reported using e-cigarettes with nonnicotine substances.[2] Shifts in social acceptability and access to cannabis could occur as several states consider legalized cannabis sales for adults. Given the high concurrent use of tobacco and other substances,[1] it is important to monitor the substances youth use in e-cigarettes. Previous research has assessed e-cigarette cannabis use among students in select grades,[3] but no study, to our knowledge, has assessed use among students more broadly, particularly middle school students. This study estimates the national prevalence of self-reported cannabis use in e-cigarettes among US middle and high school students.

Methods | Data were from the 2016 National Youth Tobacco Survey (NYTS), a cross-sectional, school-based survey of US students in grades 6 to 12. The NYTS uses a 3-stage cluster sampling design to provide a nationally representative sample of students attending public and private schools. A total of 20 675 students participated with a response rate of 71.6%. Cannabis use in e-cigarettes was determined by the response "Yes, I have used an e-cigarette device with marijuana, THC [tetrahydrocannabinol] or hash oil, or THC wax," to the question "Have you ever used an e-cigarette device with a substance besides nicotine?" Other response options included using another substance other than cannabis, using nicotine only, or never using an e-cigarette device. The NYTS data collection was approved by the institutional review board of the Centers for Disease Control and Prevention, Atlanta, Georgia, which waived the need for human subject review for the use of deidentified data.

Analyses were weighted to provide national estimates and to account for the complex sampling design. The prevalence of cannabis use in e-cigarettes was calculated among all students (N = 20 675) and those who ever used e-cigarettes (n = 5217). Assessed correlates included sex, race/ethnicity, school level, current (past 30-day) e-cigarette use, frequency of e-cigarette use, current (past 30-day) use of other tobacco products (cigarettes, cigars, hookah, pipe tobacco, bidis, or smokeless tobacco), and living with someone who uses tobacco products. Statistical significance was determined at $P < .05$ using pairwise *t* tests.

Results | Among the 20 675 participants (50.2% male and 49.0% female; 0.8% missing; age range, 9-19 years or older), ever use of cannabis in e-cigarettes was reported by 8.9% of all students (95% CI, 8.1%-9.9%) and 30.6% of those who ever used e-cigarettes (95% CI, 28.3%-33.1%) (**Table**). Patterns of cannabis use in e-cigarettes were similar among all students and e-cigarette users. Prevalence was significantly higher among male students (10.6% [95% CI, 9.7%-11.6%; $P < .001$] for all respondents and 33.3% [95% CI, 30.7%-36.0%; $P = .005$] for e-cigarette users), high school students (12.4% [95% CI, 10.9%-14.2%; $P < .001$] for all respondents and 33.3% [95% CI, 30.1%-36.6%; $P < .001$] for e-cigarette users), current users of e-cigarettes (39.5% [95% CI, 35.7%-43.5%; $P < .001$] for all respondents and 40.3% [95% CI, 36.4%-44.3%; $P < .001$] for e-cigarette users) or other tobacco products (38.5% [95% CI,

Table. Prevalence and Correlates of Cannabis Use in e-Cigarettes Among US Middle and High School Students

Characteristic	Any Cannabis Use[a]					
	All Participants (N = 20 675)			Participants Who Ever Used e-Cigarette Devices (n = 5217)[b]		
	Unweighted No.	Weighted % (95% CI)	*P* Value[c]	Unweighted No.	Weighted % (95% CI)	*P* Value[c]
Overall	1783	8.9 (8.1-9.9)	NA	1621	30.6 (28.3-33.1)	NA
Sex						
Male	1087	10.6 (9.7-11.6)	<.001	997	33.3 (30.7-36.0)	.005
Female (reference)	682	7.2 (6.1-8.6)	NA	612	27.2 (23.6-31.3)	NA
Race/ethnicity						
White non-Hispanic (reference)	769	8.5 (7.5-9.6)	NA	697	29.1 (26.4-31.9)	NA
Other non-Hispanic	112	7.2 (5.6-9.3)	.20	99	32.9 (26.0-40.7)	.31
Black non-Hispanic	250	8.4 (7.2-9.7)	.91	217	32.8 (28.3-37.6)	.19
Hispanic	588	10.8 (9.0-12.9)	.04	551	32.4 (28.4-36.6)	.16
School level						
Middle school (reference)	446	4.5 (4.0-5.0)	NA	380	23.1 (20.5-25.9)	NA
High school	1327	12.4 (10.9-14.2)	<.001	1232	33.3 (30.1-36.6)	<.001
Current (past 30 d) e-cigarette use						
No (reference)	1166	6.1 (5.5-6.9)	NA	1008	26.3 (23.6-29.2)	NA
Yes	582	39.5 (35.7-43.5)	<.001	579	40.3 (36.4-44.3)	<.001
No. of days e-cigarettes used in the past 30 d[d]						
1-5 (reference)	NA	NA	NA	308	33.5 (28.8-38.6)	NA
6-19	NA	NA	NA	121	39.8 (33.3-46.5)	.14
20-30	NA	NA	NA	166	63.7 (55.4-71.2)	<.001
Current (past 30 d) use of any non-e-cigarette tobacco products[e]						
No (reference)	981	5.3 (4.7-6.0)	NA	834	22.6 (20.4-24.9)	NA
Yes	799	38.5 (33.9-43.2)	<.001	785	46.9 (42.3-51.6)	<.001
Live with a tobacco user						
No (reference)[f]	726	6.0 (5.3-6.8)	NA	633	27.8 (25.0-30.7)	NA
Yes	905	13.0 (11.5-14.8)	<.001	848	31.7 (29.0-34.7)	.008

Abbreviations: e-cigarette, electronic cigarette; NA, not applicable.

[a] Data are from the 2016 National Youth Tobacco Survey.

[b] Defined as those who reported any response other than "No, I have never used an e-cigarette device" to the question, "Have you ever used an e-cigarette device with a substance besides nicotine?"

[c] Calculated from pairwise *t* tests compared with the reference group.

[d] Restricted to respondents who reported using e-cigarettes on at least 1 d in the past 30 d.

[e] Defined as those who reported use of cigarettes; cigars, little cigars, or cigarillos; pipes filled with tobacco; bidis; smokeless tobacco (ie, chewing tobacco, snuff or dip, snus, dissolvable tobacco products); and/or hookahs or waterpipe on at least 1 d of the past 30 d vs use on 0 d for all listed products.

[f] Defined as those who reported "No one who lives with me now uses any form of tobacco" to the question, "Does anyone who lives with you now [select 1 or more]: A. smoke cigarettes? B. Smoke cigars, cigarillos, or little cigars? C. Use chewing tobacco, snuff, or dip? D. Use e-cigarettes? E. Smoke tobacco from a hookah or waterpipe? F. Smoke pipes filled with tobacco (not waterpipes)? G. Use snus? H. Use dissolvable tobacco products? I. Smoke bidis (small brown cigarettes wrapped in a leaf)? J. No one who lives with me now uses any form of tobacco."

33.9%-43.2%; $P < .001$] for all respondents and 46.9% [95% CI, 42.3%-51.6%; $P < .001$] for e-cigarette users), users of e-cigarettes on 20 to 30 days in the past 30 days compared with 1 to 5 or 6 to 19 days (63.7% [95% CI, 55.4%-71.2%; $P < .001$]), and those who lived with a user of tobacco products (13.0% [95% CI, 11.5%-14.8%; $P < .001$] for all respondents and 31.7% [95% CI, 29.0%-34.7%; $P = .008$] for e-cigarette users) (Table). Furthermore, among all students, prevalence was higher among Hispanics than other races/ethnicities (10.8% [95% CI, 9.0%-12.9%; $P = .04$] for all respondents).

Discussion | Nearly 1 in 11 US students, including one-third of those who ever used e-cigarettes, had used cannabis

in e-cigarettes in 2016. Among e-cigarette users, nearly 1 in 3 high school students (1.7 million) and nearly 1 in 4 middle school students (425 000) had ever used cannabis in e-cigarettes. These estimates are consistent with or higher than previous reports of cannabis use in e-cigarettes among US and Canadian students.[3-5] Estimates from these studies suggest that from 5%[5] to 8%[4] of all high school students and from 6%[3] to 18%[5] of youth who had ever used e-cigarettes had used cannabis in e-cigarettes. However, differences in question wording may limit comparability of estimates across studies.

The US Surgeon General has concluded that e-cigarette aerosol can contain harmful and potentially harmful constituents.[1] The National Academies of Sciences has found cannabis use among youth can adversely affect learning and memory and may impair later academic achievement and education.[6] Thus, strategies to reduce cannabis use in e-cigarettes are critical for protecting young people from these potential health risks.

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COMMENT & RESPONSE

Pediatric Computed Tomography Scans and Cancer Risk

To the Editor I am responding to the article by Meltzer et al,[1] which concluded that routine use of whole-body computed tomography (CT) scans for children with blunt trauma was not justifiable because such scans were not associated with reduced mortality in comparison with limited CT scans, and the scans may increase their cancer risk because children are more sensitive to radiation and at higher risk for radiation-induced cancer compared with adults.

Although some studies have concluded that there are increased cancers following childhood CT scans, such conclusions may be owing to reverse causation because the reasons for the CT scans were not taken into consideration, and other studies that considered potentially confounding clinical factors, including the reasons for the CT scans, did not observe increased cancers following childhood CT scans.[2]

The evidence generally quoted[3] for the increased radiation sensitivity of children are the atomic bomb survivor data that showed increased cancer risk in the radiation-exposed children in comparison with the exposed adults.[3] However, the increased cancer risk was observed in survivors who were exposed to high radiation doses only, and for the low radiation doses corresponding to a few CT scans, no increased cancers were observed.[4] Only by the use of the linear no-threshold extrapolation were these data used to claim increased radiation sensitivity of children.[3] The atomic bomb survivor cancer mortality data are no longer consistent with the linear no-threshold model but are consistent with radiation hormesis, and there are also additional evidence for radiation hormesis.[2]

Whereas there may be concerns about the DNA damage from the pediatric CT scans, the damage would also result in defensive responses such as increased