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Exposure to Electronic Cigarette Television Advertisements Among Youth and Young Adults

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KEY WORDS

electronic cigarettes, e-cigarettes, advertising, media, adolescents, smoking, students

ABBREVIATIONS

e-cigarette—electronic cigarette
FDA—Food and Drug Administration
TRP—target rating point

Dr Duke conceptualized and designed the study and analyses and drafted the initial manuscript; Dr Lee assisted in designing the study and drafting the initial manuscript and critically reviewed and revised the manuscript; Drs Kim, Nonnemaker, and Porter assisted in designing the study and critically reviewed and revised the manuscript; Ms Watson and Ms Arnold acquired the data and conducted the analyses and critically reviewed the manuscript; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: Electronic cigarettes have unknown health risks and youth and young adults increasingly use them. E-cigarette companies are marketing e-cigarettes using television ads. The content of these ads may appeal to young people because they emphasize themes of independence and maturity.



WHAT THIS STUDY ADDS: E-cigarette companies advertise to a broad television audience that includes 24 million youth. The reach and frequency of these ads increased dramatically between 2011 and 2013. If current trends continue, youth awareness and use of e-cigarettes are likely to increase.

abstract

FREE

BACKGROUND AND OBJECTIVE: Currently, the US Food and Drug Administration does not regulate electronic cigarette (e-cigarette) marketing unless it is advertised as a smoking cessation aid. To date, the extent to which youth and young adults are exposed to e-cigarette television advertisements is unknown. The objective of this study was to analyze trends in youth and young adult exposure to e-cigarette television advertisements in the United States.

METHODS: Nielsen data on television household audiences' exposure to e-cigarette advertising across US markets were examined by calendar quarter, year, and sponsor.

RESULTS: Youth exposure to television e-cigarette advertisements, measured by target rating points, increased 256% from 2011 to 2013. Young adult exposure increased 321% over the same period. More than 76% of all youth e-cigarette advertising exposure occurred on cable networks and was driven primarily by an advertising campaign for 1 e-cigarette brand.

CONCLUSIONS: E-cigarette companies currently advertise their products to a broad audience that includes 24 million youth. The dramatic increase in youth and young adult television exposure between 2011 and 2013 was driven primarily by a large advertising campaign on national cable networks. In the absence of evidence-based public health messaging, the current e-cigarette television advertising may be promoting beliefs and behaviors that pose harm to the public health. If current trends in e-cigarette television advertising continue, awareness and use of e-cigarettes are likely to increase among youth and young adults. *Pediatrics* 2014;134:1–8

Electronic cigarettes (e-cigarettes) are battery-powered devices resembling traditional cigarettes and are designed to deliver nicotine vapor.¹ US sales of e-cigarettes have doubled every year since they were introduced and reached \$1 billion annually as of August 2013.² From 2011 to 2012, youth prevalence of e-cigarette use doubled in terms of ever use (from 3.3% to 6.8%), current use (from 1.1% to 2.1%), and dual use with traditional cigarettes (from 0.8% to 1.6%). As of 2012, an estimated 1.8 million middle and high school students had ever used e-cigarettes.³ Almost 10% (9.3%) of students who have used e-cigarettes have never used traditional cigarettes.

The rise in e-cigarette use among youth aged 12 to 17 years poses several concerns. E-cigarette use may lead to tobacco use,⁴ undermine social norms about tobacco,⁵ and delay cessation among cigarette smokers. It is unknown whether e-cigarette use increases youth risk for nicotine addiction or serves as a gateway, increasing risks that youth will transition to using other tobacco products. Social norms regarding the acceptability of smoking can influence smoking behaviors.⁶ Evidence suggests that policies limiting tobacco use, particularly indoor air policies and household tobacco rules, engender social norms supporting cessation, reduce tobacco use initiation by youth, and decrease adult tobacco use.^{7–11} Effects of these policies may be undermined if widespread acceptance of e-cigarette use increases the acceptability of tobacco use, especially among youth, who may not distinguish between products. In addition, e-cigarettes may encourage smokers to delay cigarette cessation. Some smokers use e-cigarettes to circumvent smoking restrictions,¹ and adolescent smokers may use both e-cigarettes and traditional cigarettes rather than quitting. These concerns

are also warranted for young adults aged 18 to 24 years, given the increasing prevalence of cigarette initiation and increasing rates of transition to regular smoking during young adulthood.^{12,13}

Although researchers have yet to determine the direct health effects posed by inhalation of the vaporized chemical constituents in e-cigarettes,¹⁴ studies suggest that exposure to nicotine has deleterious effects on the brain during youth and young adulthood. During adolescence, executive functions are developing, and exposing adolescents to nicotine may alter this development.¹⁵ Animal studies show evidence of deficits induced by exposure to nicotine during adolescence, including those in serial pattern learning,¹⁶ attention and impulsivity,¹⁷ and memory,¹⁸ as well as increased anxiety and depression.^{19–21} These findings raise serious concerns about nicotine exposure from e-cigarette use among youth and young adults.

The 2009 Family Smoking Prevention and Tobacco Control Act gives the US Food and Drug Administration (FDA) regulatory jurisdiction over cigarettes and other tobacco products²²; the FDA has the authority to extend this jurisdiction to e-cigarettes.^{22,23} The FDA has announced its intent to regulate e-cigarettes as tobacco products.²⁴ An evidence base to inform regulatory decisions at the federal, state, and local levels is needed.^{25–28} As of October 2013, 25 states have established youth access laws prohibiting sales of e-cigarettes to minors.²⁹ Recently, tobacco companies have entered the e-cigarette marketplace and substantially increased e-cigarette advertising expenditures. For example, after 1 major e-cigarette brand was acquired by a tobacco company in 2012, advertising expenditures of the product increased from \$2 million in 2011 to >\$14 million in 2012.³⁰

No widespread education campaigns exist to inform the public about the safety of e-cigarettes, and publicly available information is dominated by e-cigarette company marketing and popular media.^{4,31} Although traditional cigarette advertising has been banned from US television since 1971,³² e-cigarettes are not included in the restrictions.^{22,33} Historically, e-cigarettes have been advertised online,³⁴ potentially exposing youth and young adults to many different marketing messages.³⁵ In 2012, e-cigarette companies began airing media campaigns on television, a shift that may substantially increase the reach of messages to nearly all US households. Television remains the primary media channel through which advertisers reach US youth with messages.^{36,37} Although e-cigarette advertising on television may be designed to increase use and sales to adult US audiences,³⁸ it may also result in considerable youth exposure.

In light of the numerous concerns related to e-cigarette use during adolescence and the recent increases in advertising expenditures for e-cigarettes, studies on the type and extent of youth and young adult exposure to e-cigarette advertisements address a gap in the literature. The current study assesses the extent to which youth aged 12 to 17 years and young adults aged 18 to 24 years were exposed to US e-cigarette television advertisements.

METHODS

Data Source

Data on e-cigarette advertisements on US television networks were obtained from Nielsen, the leading provider of comprehensive television advertising data. The Nielsen Monitor-Plus service tracks commercial occurrence information on >100 US network and cable television networks and locally across 210 US designated market

areas (“media markets” hereafter).³⁹ Nielsen data are based on individual ratings of television programs obtained through weekly monitoring of US households. These data allow Nielsen to estimate the reach of commercial advertising occurring during television programs by viewer demographics.

Measures

To assess e-cigarette advertising exposure, we calculated target rating points (TRPs), the standard unit of measurement for potential television exposure, from the early appearance of e-cigarette advertising in January 2011 to the most recent data available in September 2013. TRPs are measured for a specified audience as a function of reach (the proportion of people exposed to an advertisement) and frequency (the number of times an advertisement is potentially viewed).³⁹ TRPs, aggregated from viewership ratings for each e-cigarette commercial occurrence, were calculated by quarter, year, and sponsor. TRPs were calculated for youth aged 12 to 17 years and young adults aged 18 to 24 years. For example, an ad with 50 youth TRPs per quarter is plausibly estimated to have been viewed an average of 5 times by 10% of youth or an average of 1 time by 50% of youth over a 3-month period. Individuals may have higher or lower exposure based on their own television viewing behavior. Comparison TRPs were also summarized for adults aged 25 to 34, 35 to 54, and ≥ 55 years.

TRPs were calculated for cable, network, syndicated, and spot television advertisements. Cable television ratings include 97 networks airing nationally (eg, Comedy Central, AMC). Network (broadcast) television consists of 8 networks airing nationally (eg, ABC, FOX). The number of nationally syndicated television channels includes >200 programs available to local stations (eg, *Friends*). Data include 73 919

spot television advertisements aired locally in US markets.³⁹ Ratings were adjusted to account for advertisement length, so all TRPs reflect ratings for 30-second equivalents (eg, TRPs for 60-second advertisements were doubled). Of all advertisements, 64.4% were 30 seconds, whereas 17.4% were 15, 12.6% were 60, and 5.7% were 120 seconds.

Weighting and Analysis

TRPs for national network, cable, and syndicated television media assess exposure among all youth and young adult television households, whereas spot television TRPs measure exposure in an individual media market. To compare spot television advertising with national advertising, market-level TRPs were weighted to the national population of youth and young adults. We created population-weighted TRPs by adjusting each value to account for the percentage of the US population included in each market. TRPs were multiplied by the population of the constituent counties based on 2010 US Census data, divided by the national population, and summed to estimate national exposure.

To examine changes in e-cigarette television advertising over time, trends in quarterly TRP data overall and by media type were summarized. The distribution of TRPs across e-cigarette brands airing over the study period were summarized. In addition, the cable networks and programs airing the largest proportion of advertising and markets in which youth were exposed to spot television advertising were examined.

RESULTS

National Trends in Exposure

Figure 1 displays quarterly trends in national e-cigarette advertising TRPs from January 2011 through September 2013 by age. Throughout most of 2011 and the first half of 2012, youth were

exposed to <100 quarterly TRPs of e-cigarette television advertising. During the latter half of 2012 and the first 3 quarters of 2013, youth exposure increased substantially, peaking at 347 TRPs from April to June 2013 and declining to 275 TRPs from July to September 2013. From October 2012 through September 2013, youth were exposed to 1054 cumulative yearly TRPs. Although youth audience reach data cannot be separated from frequency data because they are proprietary to paid advertisers, TRPs can be used to estimate the average frequency of ad exposure for fixed percentages of the population. For example, based on the cumulative yearly TRPs, 50.0% of all youth in US television households were exposed to an average of 21 e-cigarette advertisements from October 2012 through September 2013. Alternatively, the same cumulative yearly TRPs could represent an exposure to an average of 105 advertisements for 10% of all US youth or an exposure to an average of 13 ads for 80% of all US youth over the 1-year period. Youth exposure to television e-cigarette advertisements increased 256.0% from 2011 to 2013.

Over the study period, young adults were exposed to higher national TRPs than youth, and TRP patterns were similar (Fig 1). Young adults were exposed to more than 300 TRPs in each quarter from October 2012 through September 2013, peaking at 611 quarterly TRPs from April to June 2013. From October 2012 through September 2013, young adults were exposed to 1742 cumulative TRPs. Similar to youth, the TRPs for young adults can be used to estimate the average frequency of ad exposure for fixed percentages. For example, based on the cumulative TRPs, 50.0% of all young adults in US television households were exposed to an average of 35 e-cigarette advertisements from October 2012 through

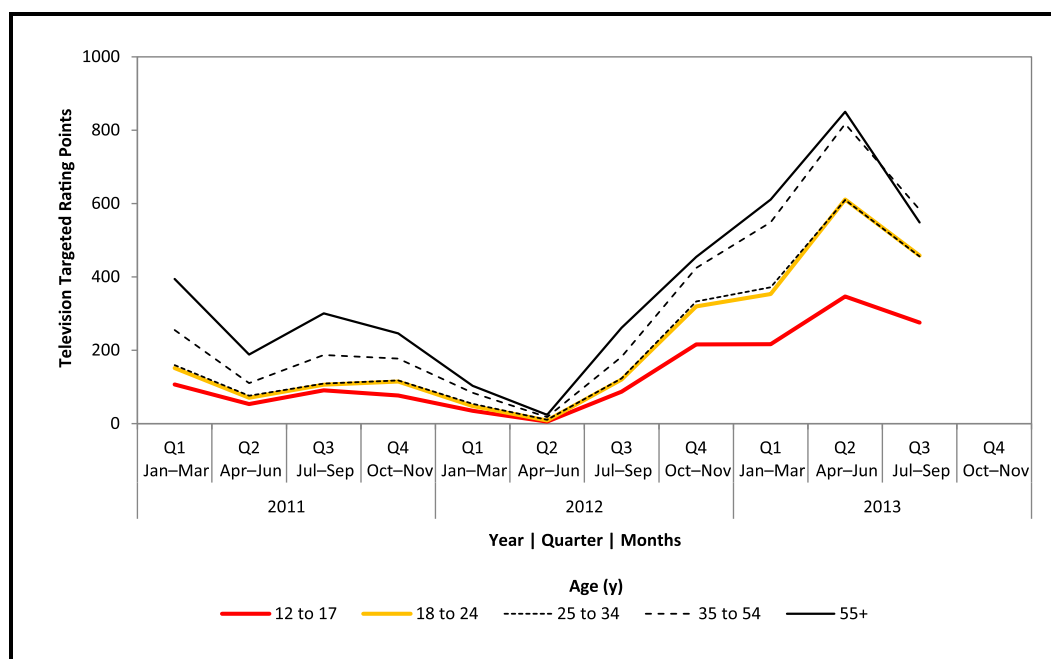


FIGURE 1
Exposure to e-cigarette television advertisements, January 2011 to September 2013.

September 2013. Young adult exposure to television e-cigarette advertisements increased 321.0% from 2011 to 2013.

Television Media Type and Popular Networks

Cable television accounted for the largest proportion of all TRPs among youth and young adults (Table 1). Overall, 75.5% of U.S. e-cigarette advertising exposure to youth from January 2011 to September 2013 occurred on cable networks (75.0% for young adults). Consistent with the increasing national trend overall, e-cigarette advertising from October 2012 through September 2013 accounted for 69.9% of all youth television exposure and 73.8% of all young adult exposure during the 11 quarters examined in the study.

In 2013, the cable network AMC aired the most e-cigarette advertising reaching youth audiences at 8.0%, followed by Country Music Television (6.1%), Comedy Central (5.9%), WGN America (5.4%), TV Land (5.3%), and VH1 (5.3%). E-cigarette advertisements appeared on programs (eg, *The Bachelor*, *Big*

Brother, *Survivor*) that were among the 100 highest-rated youth programs for the 2012–2013 viewing season.

Distribution of Advertising by Brand and Time of Day

Increases in advertising were not equal across brands. The majority of youth and young adult exposure to advertisements was by 1 e-cigarette brand, which accounted for 81.7% of all nationally aired TRPs directed at youth and 80.4% of TRPs directed at young adults in 2013 (Table 2). The next leading brand accounted for 7.1% of exposure to youth and 6.7% of exposure to young adults in 2013.

During Quarter 3 of 2013, 52.9% of TRPs for the e-cigarette brand with the majority of television advertising reaching the youth audience aired overnight (1–7 AM), followed by 21.6% in prime time (8–11 PM) and 14.8% in late night (11 PM–1 AM). Similarly, 55.5% of TRPs reaching the young adult audience aired overnight, followed by 19.5% in prime time and 15.3% in late night. Data on the popularity of television

viewing by day part provide context for advertising reach to youth and young adults. At any given time, approximately 8% of US youth (10% of young adults) are watching programs overnight, 25% of youth (24% of young adults) are watching programs in prime time, and 16% of youth (19% of young adults) are watching in late night.

Local Advertising and Targeted Media Markets

In contrast to the high levels of national advertisements by 1 major brand, there was a greater variety of brands and lower level of spot television advertising. Nineteen companies aired advertisements locally over the study period. In 2011, 2 spot television campaigns aired, with a mean of 50 quarterly youth TRPs. The first brand aired in 51 media markets containing 40.4% of US youth; the second aired in 45 media markets containing 28.9% of US youth. The 8 other brands advertising in 2011 reached 4% of US youth on average. In 2013, 1 spot television campaign aired in 9 media markets containing 22.4% of

TABLE 1 Quarterly Television TRPs by Age and Media Type, January 2011 to September 2013

	Youth (12–17 y)					Young Adults (18–24 y)				
	Cable (%)	Network (%)	Syndicated (%)	Spot ^a (%)	Total (%)	Cable (%)	Network (%)	Syndicated (%)	Spot ^a (%)	Total
2011										
Q1: Jan–Mar	37 (34.8)	5 (5.0)	0 (0.0)	64 (60.1)	107 (100)	56 (36.9)	5 (3.2)	0 (0.2)	90 (59.7)	152 (100)
Q2: Apr–Jun	27 (51.3)	6 (12.1)	0 (0.0)	19 (36.6)	53 (100)	34 (47.6)	4 (5.7)	0 (0.0)	33 (46.6)	70 (100)
Q3: Jul–Sep	55 (60.8)	19 (20.8)	0 (0.2)	17 (18.2)	91 (100)	71 (66.6)	14 (13.2)	0 (0.1)	21 (20.1)	106 (100)
Q4: Oct–Nov	40 (52.4)	18 (23.3)	2 (2.8)	16 (21.5)	77 (100)	62 (54.4)	26 (22.8)	5 (4.0)	22 (18.9)	114 (100)
2012										
Q1: Jan–Mar	10 (28.5)	14 (40.6)	0 (0.0)	11 (30.9)	35 (100)	15 (30.6)	17 (35.5)	0 (0.0)	16 (33.9)	48 (100)
Q2: Apr–Jun	3 (62.1)	0 (0.0)	0 (0.0)	2 (37.9)	6 (100)	3 (42.1)	0 (0.0)	0 (0.0)	5 (57.9)	8 (100)
Q3: Jul–Sep	63 (73.2)	18 (20.6)	3 (3.3)	2 (2.9)	87 (100)	87 (72.7)	25 (20.9)	4 (2.9)	4 (3.5)	120 (100)
Q4: Oct–Nov	190 (88.1)	20 (9.1)	0 (0.2)	5 (2.5)	216 (100)	286 (89.6)	26 (8.2)	0 (0.1)	7 (2.1)	320 (100)
2013										
Q1: Jan–Mar	192 (88.5)	14 (6.4)	1 (0.4)	10 (4.7)	217 (100)	313 (88.7)	21 (6.1)	1 (0.3)	17 (4.9)	353 (100)
Q2: Apr–Jun	281 (81.1)	38 (11.1)	1 (0.2)	27 (7.7)	347 (100)	468 (76.6)	101 (16.5)	1 (0.2)	41 (6.7)	611 (100)
Q3: Jul–Sep	239 (87.0)	27 (9.7)	0 (0.1)	9 (3.2)	275 (100)	375 (82.0)	72 (15.8)	1 (0.2)	9 (2.0)	458 (100)
Total	1139 (75.5)	179 (11.9)	7 (0.5)	183 (12.1)	1508 (100)	1771 (75.0)	312 (13.2)	12 (0.5)	266 (11.3)	2360 (100)

^a Spot television advertising TRPs weighted to reflect a national population.

US youth (mean = 41 quarterly youth TRPs). The largest nationally advertised e-cigarette brand also aired locally in media markets containing 15.7% of US youth (mean = 15 quarterly youth TRPs). The 10 other brands advertised in 2013 reached 3% of US youth on average.

Although the overall reach of these spot television campaigns as a proportion of national television households is low, some media markets received high additional exposure beyond the large cable network advertisements during the study period (Fig 2). Youth in 5 media markets received ≥ 1000 TRPs over the study period.

DISCUSSION

Results show that e-cigarette companies have been advertising their prod-

ucts to a broad audience that includes 24 million youth. Youth and young adult exposure to television e-cigarette advertisements increased substantially from 2011 to 2013, with a dramatic rise from late 2012 through September 2013. In contrast to earlier research on the broader e-cigarette advertising landscape, which included more than 80 brands,³⁰ television advertising is dominated by few advertisers. The trends in youth and young adult media exposure were driven primarily by a large advertising campaign on national cable networks for 1 e-cigarette brand in addition to small, targeted local advertising.

Data on exposure levels for effective US antitobacco mass media campaigns suggest that the substantial rise in national television e-cigarette advertising levels may have begun influencing youth e-cigarette beliefs and behaviors since October 2012. The Centers for Disease Control and Prevention guidelines on advertising levels for antitobacco mass media campaigns recommend 800 quarterly TRPs for sustaining campaign effects.⁴⁰ However, some studies indicate that advertising exposure for youth may yield effects at lower levels, starting at about 300 TRPs per quarter,⁴¹ with linear increases up

to 1250 TRPs.^{41–43} Although TRP guidelines for antitobacco mass media campaigns may not be directly applicable for influence of e-cigarette advertising on youth, they offer a point of comparison. The sustained level of exposure to the unregulated messages about the benefits of e-cigarettes reported here is of concern and may pose public health harm to youth and young adults. Trends in e-cigarette television advertising suggest that recent increases in the rates of e-cigarette use may continue,³ and more research is needed to determine the effects of e-cigarette advertisements on youth and young adults. Current advertising includes celebrities and depicts e-cigarettes with vapor that is indistinguishable from cigarette smoke. Empirical evidence shows a strong association between smoking depictions in film and smoking initiation among youth and young adults.^{44–46} Furthermore, studies show that such visual cues can trigger urges to smoke.^{47,48} Additional research on the extent to which youth distinguish between e-cigarettes and traditional cigarettes could provide data on the impact of visual depictions of e-cigarette use on television.

The most widely aired e-cigarette advertisement features a film actor exhaling

TABLE 2 Percentage of Television E-Cigarette Advertising^a by Brand and Age, January 2013 to September 2013

E-Cigarette Brand	Youth Aged 12–17 y	Young Adults Aged 18–24 y
blu eCigs, %	81.7	80.4
FIN, %	7.1	6.7
Starfire, %	6.2	7.8
NJOY, %	2.7	3.0
Other brands, %	2.3	2.1
Total, %	100	100

^a Total TRPs airing on national cable, network, and syndicated television.

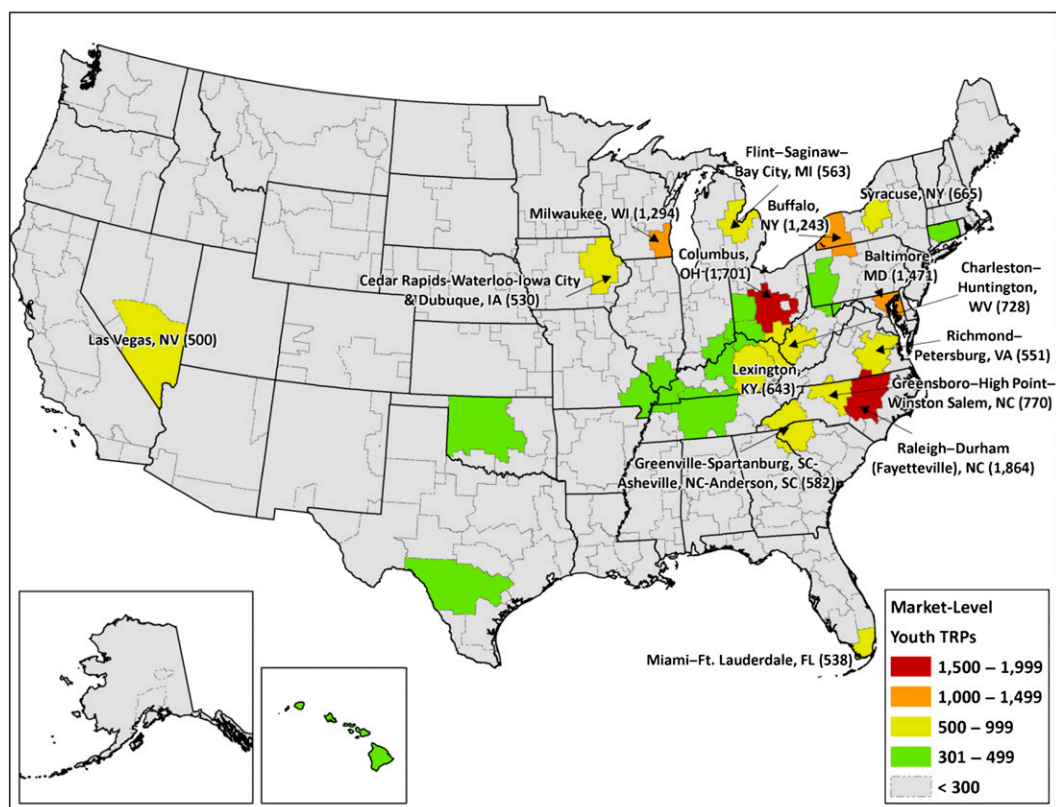


FIGURE 2

Market-level youth exposure to e-cigarette spot television advertisements, January 2011 to September 2013. Note. Yellow-shaded markets (Youth TRPs): Greensboro-High Point-Winston Salem, NC (770); Charleston-Huntington, WV (728); Syracuse, NY (665); Lexington, KY (643); Greenville-Spartanburg, SC-Asheville, NC-Anderson, SC (582); Flint-Saginaw-Bay City, MI (563); Richmond-Petersburg, VA (551); Miami-Ft. Lauderdale, FL (538); Cedar Rapids-Waterloo-Iowa City & Dubuque, IA (530). Green-shaded markets: Las Vegas, NV (500); Cincinnati, OH (426); Dayton, OH (413); Pittsburgh, PA (405); Paducah, KY-Cape Girardeau, MO-Harrisburg, IL (402); Nashville, TN (377); Hartford and New Haven, CT (360); San Antonio, TX (358); Oklahoma City, OK (357); Louisville, KY (324); Honolulu, HI (314).

e-cigarette vapor while informing viewers of numerous benefits of “smoking” the product, closing with the ad tagline, “We’re all adults here. It’s time to take back your freedom.” In her final opinion from a 2006 lawsuit between the US federal government and 2 tobacco companies, US District Court Judge Gladys Kessler determined that youth antismoking media campaigns sponsored by the tobacco industry “promote the message that smoking is an adult decision. Emphasizing that smoking is an adult activity underscores the desirability of engaging in adult behavior for adolescents who are particularly motivated to appear mature” (p. 1168).⁴⁹ More than a decade after ineffective youth prevention media campaigns sponsored by the major tobacco companies^{50–52} were removed

from television, e-cigarette advertisements with similar messages may be creating new social norms around e-cigarettes and increasing the desirability of e-cigarettes.

This is the first study to examine youth and young adult exposure to e-cigarette advertising on television during this rapidly evolving period of e-cigarette marketing in the United States. Using systematically collected exposure data from the leading agency on television advertising, we report timely evidence of marketing reach among youth and young adults during the debut of e-cigarette advertising on US television. Findings support previous research documenting increased media expenditures for e-cigarette brands acquired by tobacco companies³⁰ and confirms that greater expenditures lead directly

to greater youth and young adult exposure to e-cigarette television advertising. Study limitations include the use of TRP data to measure e-cigarette advertising. TRPs represent estimates of potential exposure at the population level for each age group in the study, and individuals may receive more or less exposure depending on the frequency of and program selected for viewing. Although TRPs are an accurate indicator of exposure, they are abstract because data on reach and frequency are proprietary to e-cigarette advertisers. However, TRPs are a valid, standard metric that correlates highly with recall of advertising for antitobacco mass media campaigns.^{41,53,54} Results are limited to television advertising; exposure through other media (eg, online, radio, print), advertisements at the

point of sale, and observations of people using e-cigarettes may affect related beliefs and behaviors.

CONCLUSIONS

E-cigarettes have unknown health risks and deliver nicotine, raising health

concerns about youth and young adult use. E-cigarette companies advertise their products to a broad audience that includes 24 million youth, and youth and young adult television exposure has increased dramatically between 2011 and 2013. In the absence of evidence-based public health mes-

saging, television advertising may be promoting beliefs and behaviors that pose harm to the public health. If current trends in e-cigarette television advertising continue, awareness and use of e-cigarettes are likely to increase among youth and young adults.

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