CHARACTERISTICS OF US ADULTS ATTEMPTING TOBACCO USE CESSATION USING E-CIGARETTES

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Abstract

Background—Use of e-cigarettes for tobacco cessation efforts is a growing trend in the United States. However, little is known about the factors that determine the use of e-cigarettes for this specific purpose.

Methods—This study examined current and former cigarette smokers that reported ever using e-cigarettes. Data were obtained from a 2018 Texas population health assessment survey (n=569) and weighted to be representative to Texas. A multivariable logistic regression was used to assess the socio-demographic and behavioral correlates of using e-cigarettes for tobacco cessation.

Results—Overall, 41.3% of e-cigarette users reported using them for tobacco cessation. Among ever e-cigarette users, Non-Hispanic blacks (aOR: 0.21; 95% CI, 0.07-0.64), males (aOR: 0.40;

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95% CI, 0.20-0.80), and individuals not confident in obtaining health information (aOR: 0.38; 95% CI, 0.15-0.96) were less likely to use e-cigarettes for tobacco use cessation. Conversely, among ever e-cigarette users, odds of using e-cigarettes for tobacco cessation were higher among those who were 35 to 44 years old (aOR: 3.68, 95% CI: 1.26-10.71), those who received advice to quit smoking from a healthcare professional (aOR: 2.77, 95% CI, 1.36-5.64), and those with more than 5 years since their last routine checkup (aOR: 3.91; 95% CI, 1.23-12.45).

Conclusion—Findings from this study suggest that both health behaviors and sociodemographic factors predict use of e-cigarettes for the purpose of tobacco cessation. Furthermore, the relationship between use of e-cigarettes as a cessation device and being advised to quit tobacco use by a healthcare professional calls for additional investigation.

Keywords

E-cigarette; Tobacco; Cessation; Sociodemographic; Health Behaviors

INTRODUCTION

In 2017, 34.3 million adults[1] in the United States smoked cigarettes. While this figure represents a more than 32% reduction in adult cigarette smoking since 2009,[1] the use of alternative tobacco products, particularly electronic cigarettes (e-cigarettes) has increased substantially in the US.[1,2] Specifically, 6.9 million US adults were e-cigarette users, with young adults (i.e., 18–24) having the greatest prevalence of e-cigarette use as of 2017.[1]

E-cigarettes, which are currently regulated as tobacco products[3], are sometimes used as smoking cessation aids among combustible tobacco users.[4–7] For example, a study revealed approximately 32% of current and former cigarette smokers in the US reported use of e-cigarettes as a cessation device.[5] Several observational studies and systematic reviews highlight the effectiveness of e-cigarettes in aiding tobacco cessation attempts.[8–11] In an extensive review of existing literature, Hartmann-Boyce et al. determined that the overall quality of literature that demonstrates e-cigarettes as an effective cessation aid is low.[12] The randomized trials reviewed at this time were limited by sample size and use of first generation e-cigarette devices which typically do not deliver nicotine in the concentrations expected from smoking.[12–14] However, a recent large randomized clinical trial evaluating e-cigarette use for smoking cessation showed that continuous abstinence rates at 1-year were substantially higher among cigarette smokers provided e-cigarettes (18.0%) than in those given one or more nicotine replacement therapies (9.9%).[15] It is however important to note that this study also differs from earlier trials[13,14] in that participants demonstrated motivation to quit a priori.

Several studies have evaluated the associations between e-cigarette use and smoking cessation outcomes or intentions[10,16–20]; sociodemographic predictors of switching from cigarette smoking to e-cigarette use, by smoking cessation status[21]; and cessation aid modality (including self-reported use of e-cigarettes) and cessation outcomes.[22,23] However, the literature is scarce regarding the unique sociodemographic attributes of individuals who use e-cigarettes for tobacco use cessation, and the health behaviors associated with the choice of this modality have not been previously described.

Health behavior is defined as "activity undertaken by individuals for the purpose of maintaining or enhancing their health, preventing health problems, or achieving a positive body image."[24] These behaviors include but are not limited to: diet, physical activity, sleep, avoidance of risky behaviors (such as substance abuse), healthcare seeking behaviors and adherence to prescribed medical treatments.[25]

While previous studies have found health behaviors to play a central role in the overall approach and outcomes related to tobacco use cessation efforts, [26–28] it is not known if health behaviors determine choice of cessation aid modality, specifically as they pertain to use of e-cigarettes for cessation. Furthermore, associations between health behaviors and use of e-cigarettes for tobacco use cessation have not been previously assessed in an ethnically diverse population. Therefore, the purpose of this study was to determine the frequency of e-cigarette use for cessation and to characterize the individual predictors of such use in relation to i) sociodemographic factors and ii) health behaviors.

METHODS

Data Source and Survey Methods

Data used in this study were obtained from a 2018 Texas population health assessment survey (n = 2034), which was part of a National Cancer Institute–funded initiative for population health assessment in catchment areas of National Cancer Institute–designated cancer centers.[29] This cross-sectional survey used a nonprobability sampling design and collected surveillance data on wide-ranging health indicators, predictors, and outcomes. The survey was administered by Qualtrics among online research panelists and has been previously described.[30] The study population was racially and ethnically diverse and non-Hispanic blacks (NHBs) were oversampled to increase robustness of data in this racial group. Because the data were oversampled, we applied weighting adjustments to ensure that the weighted sample distributions are similar to the target population distribution along key demographic dimensions. The population data from the American Community Survey were used to compute weights at base and post-stratification stages. The weighted percentage of study population included 35.7% Hispanics, 45.5% non-Hispanic whites (NHWs), and 10.6% NHBs.

Study Population

The study was restricted to current and former smokers, who were ever-users of e-cigarettes. Ever-users of e-cigarettes were selected by a response of "Yes" to the question, "Have you ever used an e-cigarette or other electronic "vaping" product, even just one time, in your entire life?" Therefore, we arrived at a final sample size of 569 individuals based on affirmative responses to the above survey question. MD Anderson's Institutional Review Board approved the study protocol (PA16–0724).

Outcome Measures

The primary outcome measure analyzed in this study was the self-reported use of e-cigarettes for purpose of tobacco use cessation. This outcome was derived by the response to

the question, "Do/did you use e-cigarettes as an alternative to quitting tobacco altogether?" Responses were categorized as "Yes" or "No."

Predictor Measures

Independent predictors were broadly classified into sociodemographic factors and health behaviors. Several sociodemographic characteristics were examined. First, this study examined age, which was categorized into the following groups: 18–24 (referent), 25–34, 35–44, 45–54, 55–64, 65+. Sex is a dichotomous variable; females served as the referent group. Race/ethnicity was categorized as NHW (referent), NHB, Hispanic/Latino, and other races. Marital status was dichotomized as "Married or living as married" and "not married." (referent). Education was categorized as less than high school (referent), completed high school, post high school/some college, college/postgraduate. Occupational status was categorized as employed (referent), disabled, homemaker, retired, student, unemployed and other. Income was categorized as $0 - $19,999 (referent), $20,000 - $49,999, $50,000 - $74,999(referent), $75,000 - $99,999, $100,000 and over. Residency was dichotomized as rural and urban (referent). These classifications were defined for this dataset by matching ZIP codes to county designations.[31,32] Health insurance coverage was dichotomized as "no" (referent) for individuals with no health insurance coverage and "yes" for individuals with health insurance coverage. Self-reported cost barriers to healthcare access was assessed via the following question: *"In the past 12 months, was there a time when you needed to see a doctor, but could not because of cost?" Possible responses were "no" (referent) and "yes."*

Health behaviors were determined by responses to the following survey questions: 1) "*About how long has it been since you last visited a doctor for a routine checkup*?" Response categories were: "within the past year" (referent), "1–2 years ago", "3–5 years ago", "more than 5 years ago". 2) "*In general, how much would you trust information about health or medical topics from each of the following: Doctor, Internet, Media, Friends or Family*? "To each of the categories response options were either "A lot" – categorized "yes" (referent), or "not at all" categorized "no". 3) "*How often do you do VIGOROUS leisure-time physical activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate*?" Respondents were instructed to fill-in number of times and analyzed as a continuous variable. 4) "*How often do you do MODERATE LEISURE-TIME physical activities for AT LEAST 10 MINUTES that cause ONLY MODERATE increase in breathing or heart rate*?" Respondents were instructed to fill-in number of times and analyzed as a continuous variable. 5) "*In the past 12 MONTHS, has a medical doctor, dentist, or other health professional ADVISED you to quit smoking, or to quit using other kinds of tobacco?"* Response categories were "yes" or "no" (referent). 6) "*Overall, how confident are you that you could get advice or information about health or medical topics if you needed it*?" Those who responded either completely, very, or somewhat confident were categorized "confident" (referent), while those who responded a little or not confident were categorized "not confident". 7) "*On average, how many hours of sleep do you get in a 24-hour period*?" Respondents were asked to fill in number of hours slept and analyzed as a continuous variable. 8) Respondents who felt depressed daily, weekly, monthly or a few times a year were asked: "*Do you take medication for depression*?" response categories were "yes" or "no" (referent). 9) "*In the past 30 days, how often did you drink any type of*

alcoholic beverage?" Response categories were as dichotomized as "none" (referent) and "Greater or equal to 1 day." Variables in this study that have been used to describe health behaviors were informed by earlier studies.[25,33,34]

Data Analysis

Weighted prevalence estimates of sociodemographic characteristics and health behaviors were estimated for individuals who reported using e-cigarettes for tobacco use cessation. The Wald χ^2 test was conducted to evaluate subgroup differences by sociodemographic and health seeking behaviors among those who reported using e-cigarettes for tobacco use cessation. Weighted multilevel multivariable logistic regression was carried out using PROC SURVEYLOGISTIC in a model to determine the likelihood of: 1) the association between use of e-cigarettes for tobacco use cessation and sociodemographic characteristics and 2) the association between use of e-cigarettes for tobacco use cessation and health behaviors. The survey questions: "In the past 12 MONTHS, has a medical doctor, dentist, or other health professional ADVISED you to quit smoking, or to quit using other kinds of tobacco?" and "Do you take medication for depression?" did not apply to some respondents (tagged inapplicable), who were excluded from the questions through logic "skip patterns" designed within the electronic survey. Overall, missing values were <1% for all study variables and were addressed in the analysis phase by excluding all participants who had missing variables from analysis. *P* values less than 0.05 were considered significant. All analyses were carried out using SAS (version 9.4).

Results

Descriptive Characteristics

The frequency of ever-use of e-cigarette in our study population (28.5%) was significantly higher than national estimates reported from 2016 data (15.3%).[2] Among ever e-cigarette users, 41.3% reported using e-cigarettes for the purposes of tobacco use cessation (Table 1). NHWs constituted approximately half of the population reporting use of e-cigarettes for tobacco use cessation. Among age groups, individuals aged 18 to 24 years had the smallest proportion of ever users of e-cigarettes, who reported using e-cigarettes for the purpose of tobacco use cessation (20.1%).

Approximately 64% of individuals who were advised to quit smoking cigarettes by a healthcare professional reported using e-cigarettes for the purpose of tobacco use cessation. Among those who had health insurance coverage, 43% used e-cigarettes for tobacco use cessation. Individuals whose last routine health checkup occurred more than 5 years ago had a higher prevalence (47.4%) of using e-cigarettes for tobacco use cessation compared with individuals whose last checkup was more recent. A significant proportion of our study sample (88.9%) trusted health or medical information obtained from a doctor; of these individuals, 40.6% used e-cigarettes for tobacco use cessation.

Multivariable Logistic Regression

Results of the weighted multivariable logistic regression are found in Table 2. Men were less likely than women to use e-cigarettes for tobacco use cessation (aOR: 0.40; 95% CI, 0.20–

0.80). Compared with NHW respondents, NHB respondents had lower odds (aOR: 0.21; 95% CI, 0.07–0.64) of using e-cigarettes for tobacco use cessation. Individuals who were 35 to 44 years old were 3.68 times more likely to report using e-cigarettes for tobacco use cessation compared with those who were 18 to 24 years old.

Several health behaviors were significantly associated with the use of e-cigarettes for tobacco use cessation. Advice from a healthcare professional to quit smoking cigarettes was found to increase the odds of using e-cigarettes for tobacco use cessation (aOR: 2.77; 95% CI, 1.36–5.64). Those who were not confident in obtaining health information were less likely to use of e-cigarettes for tobacco use cessation than those who were confident in obtaining health information (aOR: 0.38; 95% CI, 0.15–0.96). Respondents whose last routine checkup occurred more than 5 years ago had higher odds (aOR: 3.91; 95% CI, 1.23–12.5) of using e-cigarettes for tobacco use cessation than those who had a routine checkup within the past year.

DISCUSSION

In this study of an ethnically diverse population, more than 40% of adult ever-users of e-cigarettes reported using them for the purposes of tobacco use cessation. This finding mirrors other studies that have reported similar high rates of utilization of e-cigarettes as a means to quit tobacco use.[4–7] Consistent with previous research, [5,23] sociodemographic characteristics of study participants were found to be determinants of use of e-cigarettes for tobacco use cessation. Specifically, use of e-cigarettes for tobacco use cessation was significantly associated with age, race/ethnicity, and sex. Furthermore, to our knowledge, this study is the first to report key health behaviors that predict the use of e-cigarettes for tobacco use cessation. After controlling for sociodemographic characteristics, health behaviors that were associated with use of e-cigarettes for tobacco use cessation included level of confidence in obtaining health information/advice, having been advised by a health professional to quit smoking, and duration in years since last visit to a physician for routine checkup.

One key finding was that NHBs were significantly less likely to use e-cigarettes for tobacco use cessation than NHWs. This finding is consistent with those of a nationally representative study that found that NHBs were less likely than NHWs to use e-cigarettes for tobacco use cessation.[5] Several studies have found an increased likelihood of use of e-cigarettes for tobacco use cessation in individuals of higher compared with lower socioeconomic status. [23,35] this may explain our finding of lower odds of utilization of e-cigarettes for tobacco use cessation among NHBs compared with NHWs, given that a predominant population of NHBs in our study sample were of low socioeconomic status. More than 65% of NHBs in our study earned less than $50,000 annually, with more than 30% categorized in the lowest income tier ($0 - $19,999).

While Brown et al. found no statistical association between sex and cessation aid modality, [23] we found that men were less likely than women to use e-cigarettes for tobacco use cessation. In addition to presenting an interesting contrast from nationally representative figures which document the highest frequency of use of e-cigarettes among young adults

(i.e., 18–24 years old),[1] our study provides some insight to age-specific motivation for e-cigarette use. We found an increased likelihood of using e-cigarettes for tobacco use cessation among respondents who were 35 to 44 years old, a finding that is consistent with the national average age for tobacco use cessation (39.5 to 40.0 years).[36] Therefore, it is plausible that the 35 to 45–year-old cohort in our study would make the most active tobacco use cessation attempts, utilizing tools available to them, including e-cigarettes.

Our analysis established health behaviors as key predictors of use of e-cigarettes for tobacco use cessation. For example, we found that individuals who had not presented to a physician for a routine checkup in more than five years were almost four times more likely to use e-cigarettes for tobacco use cessation than were those who have had a routine checkup within the past year. Participation in routine health checkup within the past year has been shown to be a predictor of smoking cessation, [34] given that these smokers should be more commonly exposed to evidence-based cessation counselling or pharmacotherapy, administered by healthcare professionals. However, it is plausible that individuals who have not had a routine health checkup in over 5 years would be prone to using alternative cessation aids, such as e-cigarettes.

In further assessment of the relationship between health behaviors and use of e-cigarettes for cessation, respondents were assessed for their perceived self-efficacy in obtaining health-related information, a measure of health literacy. Health literacy is an important indicator of an individual's overall ability to make favorable health decisions. Individuals who were not confident in obtaining health information or advice had lower odds of using e-cigarettes for tobacco use cessation than did those who were confident. This suggests that low perceived selfefficacy in obtaining cessation-related information may have had a preventive effect on the use of e-cigarettes for this purpose, as these individuals likely had limited exposure to promotions or forums discussing use of e-cigarettes for tobacco use cessation on media platforms such as the internet.[37] While previous studies point to associations between low health literacy and tobacco use cessation predictors[38] and outcomes,[28] our findings suggest that low health literacy also plays a determining role in the use of e-cigarettes for tobacco use cessation.

The influence of healthcare providers on their patients' tobacco use cessation efforts and outcomes is strong, especially when cessation counselling is administered appropriately. About 85% of respondents in our study said they trusted health information from their doctor. Despite this remarkably high level of confidence in healthcare providers, less than 40% of respondents had been advised to quit by a healthcare provider. Among those who had been advised to quit by a healthcare professional, 64% reported using e-cigarettes for this purpose. While other regions (e.g. England) recommend the use of e-cigarettes as a cessation aid, [39] these products are not recognized, approved, or regulated as tobacco cessation aids in the United States. [40] Hence findings from our survey of US adults, showing a more than threefold increase in odds of e-cigarette use for cessation attempts, following counselling from a healthcare provider, are indeed concerning. Presented findings, as well as previous studies, suggest possible inadequacies in cessation counselling by medical professionals.[41,42] For example, one study found that while healthcare providers advised smokers to quit, only 36% proceeded to discuss pharmacotherapeutic options.[41] Another

study of cessation counselling sessions reported a low prevalence of discussion surrounding the use of e-cigarettes for tobacco use cessation, even though most respondents indicated a need for further information on this modality in postcounselling surveys.[42]

Findings from our study have several important implications. First, given that our results may be suggestive of a need for clarity during cessation counselling sessions, it is important to incorporate the latest evidence on e-cigarettes into these sessions, as well as inquire about use of these products. Healthcare providers have an important role in educating cessation-seeking adults on the full array of options available to them and, importantly, informing them that scientific evidence backing the use of e-cigarettes for this purpose remains elusive. The positive influence of healthcare providers on patients' normative behaviors could be channeled toward effective delivery of smoking cessation counselling by providing specialized education through programs such as MD Anderson Cancer Center's certified tobacco treatment training program. One study showed that tobacco cessation training of physicians had a positive impact on patient counselling,[43] while another study reported that such training increased self-efficacy among healthcare professionals.[44] Second, sociodemographic and health behaviors identified in this study should be taken into consideration for interventions. Populations with low health literacy may benefit from mass media campaigns aimed at boosting use of evidence-based means for tobacco use cessation.

This study is not without limitations. First, data were self-reported and subject to recall and social desirability bias. Second, because data were obtained through a cross-sectional survey, we cannot make any causal inferences for any of our study findings. Third, while this study assessed intentionally using e-cigarettes for the purposes of cessation, a recent study found that cessation via e-cigarette use can occur inadvertently.[45] As such, the presented study can only speak to direct cessation attempts via e-cigarette and is unable to examine inadvertent cessation. Future study is needed to examine this nuance in cessation behavior among adult combustible tobacco users. Fourth, the question used for the index study's main outcome was not thoroughly explicit in its assessment of e-cigarette use for the purpose of smoking cessation and may have led to misinterpretation by some respondents. For example, it is plausible that some current smokers may have self-reported using e-cigarettes for the purpose of cessation though their primary purpose would have been harm reduction (i.e., reduced tobacco product use), rather than total tobacco cessation. However, in line with the ultimate goal of our study, this question collects data that highlights the purposeful use of e-cigarettes, in the context of ongoing or completed smoking cessation efforts. Lastly, data were not available for concurrent use of FDA-approved tobacco use cessation aids such as nicotine replacement therapy; or specific counselling behavior on the part of the providers, hence we could not examine for possible interactions. However, a major strength of this study was our use of a large ethnically and racially diverse population. Furthermore, we present new findings relevant to cessation behavior literature.

Conclusion

The use of e-cigarettes for tobacco use cessation is common. Findings from this study provide key insights to the underlying sociodemographic factors and health behaviors that predict the use of e-cigarettes for tobacco use cessation. Given that e-cigarettes are not

approved for tobacco cessation in the US, our finding of a heightened tendency to use e-cigarettes for this purpose following counselling from healthcare professionals warrants additional investigation, as well as intervention to ensure guideline adherent counselling practices. Furthermore, it is important for providers to assess smoking status at every appointment and offer evidence-based, proven-effective cessation strategies. Although these are documented to be highly successful and readily available, our data suggests that this is not being implemented as is recommended.

Acknowledgement

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HIGHLIGHTS

- Use of e-cigarettes for the purposes of tobacco use cessation is common

- Sociodemographic characteristics predict use of e-cigarettes for cessation

- Health behaviors are associated with use of e-cigarettes for cessation

- Cessation advice by physician increased odds of quit attempts using e-cigarettes

- Nearly two-thirds of those advised to quit smoking made efforts using e-cigarettes

Table 1

Distribution and characteristics of ever users of e-cigarettes by use of e-cigarettes for tobacco use cessation.

Characteristics	Do/Did you use e-cigarettes as an alternative to quitting tobacco altogether? [n = 569]					
	n	Wt%	Yes [n = 222 (41.3%)]		No [n = 347 (58.7%)]	
			n	Wt. %	n	Wt.% %
Sex	569					
Female	370	51.7	145	42.3	225	57.7
Male	199	48.3	77	40.2	122	59.8
Race/Ethnicity	569					
White, non-Hispanic	185	44.7	95	49.9	90	50.2
Black, non-Hispanic	107	9.1	38	32.6	69	67.4
Hispanic	236	38.8	76	34.2	160	65.8
All other races	41	7.4	13	37.6	28	62.4
Age	569					
18–24	147	21.8	29	20.1	118	79.9
25–34	188	31.6	73	41.0	115	59.0
35–44	107	15.6	58	58.0	49	42.0
45–54	56	12.7	19	32.9	37	67.2
55–64	59	14.4	35	55.7	24	44.3
65+	12	3.9	8	70.3	4	29.7
Education	568					
Less than High School	45	7.6	19	41.5	26	58.5
Completed high school	156	27.0	58	38.6	98	61.4
Post high school/some college	246	43.6	95	39.5	151	60.5
College/Postgraduate	121	21.8	50	48.6	71	51.4
Marital Status	568					
Not Married[a]	314	54.0	105	34.8	209	65.2
Married or living as married	254	46.0	117	49.2	137	50.9
Residence	569					
Rural	239	50.4	111	46.8	128	53.2
Urban	330	49.6	111	35.7	219	64.3
Income	569					
$0–$19,999	170	28.3	61	34.9	109	65.1
$20,000–$49,999	194	34.7	81	44.1	113	55.9
$50,000–$74,999	102	17.5	44	47.3	58	52.7
$75,000–$99,999	59	11.0	22	42.9	37	57.1
$100,000 and over	44	8.5	14	36.6	30	63.4
Occupation Status	568					
Disabled	49	10.0	27	56.2	22	43.8
Employed	298	52.1	123	43.0	175	57.0
Homemaker	63	9.1	18	31.5	45	68.5

Characteristics	Do/Did you use e-cigarettes as an alternative to quitting tobacco altogether? [n = 569]					
	n	Wt%	Yes [n = 222 (41.3%)]		No [n = 347 (58.7%)]	
			n	Wt. %	n	Wt.% %
Other	15	3.0	8	60.2	7	39.8
Retired	21	5.3	13	65.2	8	34.8
Student	41	6.0	9	16.5	32	83.5
Unemployed	81	14.4	24	29.2	57	70.8
Healthcare insurance coverage	569					
No	209	35.9	78	38.4	131	61.6
Yes	360	64.1	144	43.0	216	57.0
Unable to see doctor because of cost?	569					
No	283	50.2	99	37.5	184	62.5
Yes	286	49.8	123	45.1	163	54.9
Advised to quit smoking by healthcare provider[b]	435					
No	276	63.1	106	40.4	170	59.6
Yes	159	37.0	105	63.6	54	36.4
Confidence in obtaining health information/advice	568					
Confident	491	85.4	195	42.1	296	57.9
Not confident	77	14.6	26	35.4	51	64.6
Trust health or medical information from:	569					
Doctor (Yes)	508	88.9	195	40.6	313	59.4
Family (Yes)	320	54.2	123	39.6	197	60.4
Media [magazine, radio, TV] (Yes)	205	34.2	87	41.9	118	58.1
Internet (Yes)	333	56.5	132	41.2	201	58.8
Time since last visit to a doctor for a routine checkup	543					
Within the past year	318	58.9	127	41.6	191	58.4
1–2 years ago	118	21.3	42	40.9	76	59.1
3–5 years ago	54	9.7	22	41.8	32	58.2
More than 5 years ago	53	10.0	25	47.4	28	52.6
Depression[c]	465					
No	368	78.9	138	40.7	230	59.3
Yes	97	21.1	50	51.8	47	48.2
Alcohol Consumption in Past 30 days	569					
None	240	41.8	81	38.0	159	62.0
> = 1 day	329	58.2	141	43.7	188	56.3
Vigorous physical activity (per day)	0.71	1.7	0.79	1.8	0.67	1.6
Moderate physical activity (per day)	0.97	1.9	1.09	1.9	0.90	1.9
Hours of sleep	6.90	2.2	6.93	2.3	6.90	2.1

[a]Category for respondents who selected categories other than "married" or "living as married", including: Divorced, Separated, Single – never been married, Widowed.

[b]In the past 12 MONTHS, has a medical doctor, dentist, or other health professional ADVISED you to quit smoking, or to quit using other kinds of tobacco?

[c]Respondents who felt depressed daily, weekly, monthly or a few times a year were asked: "Do you take medication for depression?" response categories were "yes" or "no".

Table 2

Multivariable logistic regression assessing the association between use of e-cigarettes for tobacco use cessation and sociodemographic factors and health behaviors of Texas adults.

Predictors	aOR[a]	95% CI	P-value
Sex			
Female	Ref		
Male	0.40	0.20–0.80	**0.010**
Race/Ethnicity			
White, non-Hispanic	Ref		
Black, non-Hispanic	0.21	0.07–0.64	**0.006**
Hispanic	0.61	0.28–1.30	0.197
All other races	0.50	0.12–2.05	0.336
Age			
18–24	Ref		
25–34	1.32	0.55–3.17	0.540
35–44	3.68	1.26–10.71	**0.017**
45–54	1.32	0.39–4.46	0.651
55–64	2.62	0.78–8.85	0.119
65+	2.10	0.24–18.13	0.500
Education			
Less than High School	Ref		
Completed high school	1.02	0.28–3.74	0.978
Post high school/some college	1.18	0.33–4.26	0.803
College/Postgraduate	1.82	0.48–6.92	0.377
Marital Status			
Not Married[b]	Ref		
Married or living as married	1.73	0.88–3.39	0.113
Residence			
Urban	Ref		
Rural	0.76	0.37–1.54	0.446
Income			
$50,000–$74,999	Ref		
$0–$19,999	0.69	0.25–1.95	0.486
$20,000–$49,999	0.70	0.28–1.80	0.462
$75,000–$99,999	0.80	0.22–2.89	0.727
$100,000 and over	0.51	0.14–1.94	0.323
Occupation Status			
Employed	Ref		
Disabled	1.61	0.46–5.73	0.457
Homemaker	0.39	0.15–1.07	0.068
Other	3.28	0.48–22.38	0.225
Retired	0.42	0.07–2.53	0.345

Predictors	aOR[a]	95% CI	P-value
Student	0.41	0.13–1.28	0.124
Unemployed	0.51	0.19–1.40	0.192
Healthcare insurance coverage			
No	Ref		
Yes	0.78	0.37–1.65	0.519
Unable to see doctor because of cost?			
No	Ref		
Yes	0.80	0.43–1.49	0.486
Advised to quit smoking by healthcare provider[c]			
No	Ref		
Yes	2.77	1.36–5.64	**0.005**
Confidence in obtaining health information/advice			
Confident	Ref		
Not confident	0.38	0.15–0.96	**0.040**
Trust health or medical information from:			
Doctor	1.17	0.41–3.38	0.770
Family	1.16	0.64–2.11	0.614
Media	0.76	0.38–1.51	0.428
Internet	0.79	0.39–1.63	0.530
Time since last visit to a doctor for a routine checkup			
Within past year	Ref		
1–2 years ago	1.16	0.50–2.65	0.733
3–5 years ago	1.74	0.60–5.05	0.310
More than 5 years ago	3.91	1.23–12.45	**0.021**
Depression[d]			
No	Ref		
Yes	0.89	0.42–1.91	0.764
Alcohol Consumption in Past 30 days			
None	Ref		
>= 1 day	1.80	0.97–3.33	0.061
Vigorous Physical Activity (times per day)	1.16	0.98–1.37	0.089
Moderate Physical Activity (time per day)	0.92	0.78–1.09	0.319
Hours of sleep	1.07	0.95–1.21	0.260

[a] aOR = adjusted Odds Ratio.

[b] Category for respondents who selected categories other than "married" or "living as married", including: Divorced, Separated, Single - never been married, Widowed.

[c] In the past 12 MONTHS, has a medical doctor, dentist, or other health professional ADVISED you to quit smoking, or to quit using other kinds of tobacco?

[d] Respondents who felt depressed daily, weekly, monthly or a few times a year were asked: "Do you take medication for depression?" response categories were "yes" or "no".