

Supplementary Table 1. Main results of all studies (* indicates study was included in original 2016 review)

Study	Study design	Measures / Analysis	Results
Amato, 2015[26] *	Cross-sectional survey Probability sample	Descriptive statistics were used to examine reasons for e-cigarette use.	A greater proportion of current e-cigarette users cited "come in flavors other than menthol" as a reason for their e-cigarette use than past users (55.5% vs. 25.0%).
Audrain-McGovern, 2016[27]	Cross-sectional laboratory experiment Convenience sample	Regression models used to evaluate the effect of flavor on subjective rewarding value, relative reinforcing value, and absolute reinforcing value.	<p>The average subjective rewarding value across the three e-cigarettes included: unflavored (M = 3.11, SD = 1.55), dessert flavored (M = 3.69, SD = 1.78), and fruit flavored (M = 4.22, SD = 1.55). Both the fruit flavored ($\beta = 1.11$, CI: 0.58-1.64, $p < .0001$) and the dessert flavored e-cigarettes ($\beta = 0.57$, CI: 0.47-1.11, $p = .03$) were rated significantly more rewarding than the unflavored e-cigarette.</p> <p>Subjective reward was higher for the flavored e-cigarette compared to unflavored ($\beta = 0.83$, CI: 0.35–1.32, $p = .001$). This group difference meant that participants rated the unflavored e-cigarettes as “a little” and the flavored e-cigarette as “moderately” satisfying and good tasting.</p> <p>Participants took twice as many flavored puffs than unflavored e-cigarette puffs (IRR = 2.03, CI: 1.18-3.47, $p = .01$).</p>
Barnes, 2017[28]	Cross-sectional laboratory experiment Convenience sample	Linear mixed effects models used to assess abuse liability for tobacco products.	The crossover point (i.e., the largest dollar amount at which participants still choose the tobacco product over the money) for cherry flavored e-cigarettes was significantly higher than for e-cigarettes without a flavor (\$0.71 vs \$0.51, $p < .05$).
Berg, 2016[29]*	Cross-sectional survey	ANOVAs were used to compare continuous variables across	32% of nonusers included “they come in appealing flavors” as a reason for possible future e-cigarette use.

	Convenience sample	groups, and Chi-square tests were used to compare categorical variables.	<p>39% of current smokers, who were non-e-cigarette users, chose “they come in appealing flavors” as a reason for possible e-cigarette use; this is compared to <31% of nonsmokers and former smokers, $p < 0.001$.</p> <p>60.2% of current e-cigarette users chose “they come in appealing flavors” as a reason for e-cigarette use; 59.5% of those same users chose “I like experimenting with various flavors” as a reason for e-cigarette use.</p> <p>69.7% of never cigarette smokers who use e-cigarettes chose “they come in appealing flavors” as a reason for e-cigarette use; 61.4% of former cigarette smokers who use e-cigarettes chose “I like experimenting with various flavors” as a reason for e-cigarette use.</p> <p>20.3% of former e-cigarette users reported no recent use of e-cigarettes because they “don’t like the flavor(s)”.</p>
Bold, 2016[30]	Longitudinal survey Convenience sample	Logistic regression models used to examine reasons for trying e-cigarettes at wave 1 as predictors of continuing e-cigarette use at wave 2; linear regression models used to examine reasons for trying e-cigarettes at wave 1 as predictors of e-cigarette frequency at wave 2 among those who continued e-cigarette use.	<p>“Good flavors” was endorsed by 41.8% of students as a reason for first trying e-cigarettes among ever e-cigarette users, the second most highly endorsed reason for trying behind curiosity (reasons not exclusive).</p> <p>In univariate models, good flavors as a reason for first trying e-cigarettes predicted continued e-cigarette use, though it was no longer significant after adjusting for cigarette smoking status.</p> <p>In univariate models, good flavors a reason for first trying e-cigarettes predicted more frequent use, though it was no longer significant after adjusting for other covariates.</p>

Brozek, 2017[31]	Cross-sectional survey Convenience sample	Descriptive statistics used to describe attitudes and motivations for e-cigarette use.	28.3% of e-cigarette users decided to start using e-cigarettes because of the unique flavors, the fourth most cited reason behind other reasons such as desire to quit traditional cigarettes (58.7%) and less harmful effect on health (43.5%).
Buckell, 2018[32]	Cross-sectional discrete choice experiment Convenience sample	Exploded multinomial logit models used to analyze respondents' preferences.	Adult smokers prefer the following e-cigarette flavors, from most to least: tobacco, fruit/sweet, and menthol. Adult smokers with at least one quit attempt in the past year preferred all flavored (including tobacco) e-cigarettes, relative to tobacco cigarettes.
Camenga, 2017[33]	Cross-sectional survey Convenience sample	Multivariable logistic regression used to evaluate association between using e-cigarettes to quit smoking and age, gender, race, e-cigarette frequency, cigarette smoking status, preferred e-cigarette flavor, and risk perceptions.	Having a preference for "a combination of 2 or more flavors mixed together" predicted increased likelihood of using e-cigarettes to quit smoking, relative to not having a preferred flavor (aOR = 1.92, 95% CI: 1.31-2.81; p=.0008).
Chen, 2017[34]	Cross-sectional survey Probability sample	Logistic regression used to estimate association between cigarette susceptibility and e-cigarette use status, demographic characteristics, and risk factors for cigarette smoking. Multivariate logistic regression used to explore moderating variables	Among those who used e-cigarettes, youth who used the product 3 days or more were more likely to be flavored e-cigarette users than those who used e-cigarettes 1 or 2 days in the past 30 days (p<.05). The unadjusted odds ratio of being susceptible to cigarette smoking was the largest for flavored e-cigarette use (OR = 6.6, CI: 3.8-9.1, p <.0001), followed by nicotine dependence and cigarette experimentation. In the adjusted regression analysis, flavored e-cigarette users had higher

		<p>influencing direction and strength of association between e-cigarette use and smoking susceptibility.</p>	<p>odds of being susceptible to cigarette smoking than plain e-cigarette users (AOR = 1.7, CI: 1.3-2.4, $p < .001$) and non-users (AOR = 3.8, CI: 2.8-5.3, $p < .0001$), the largest effect across all demographic characteristics and smoking risk factors.</p> <p>In stratified analyses, the association between smoking susceptibility and flavored e-cigarette use was significantly higher for females (AOR = 6.5, CI: 4.2-9.9, $p < .01$) than males (AOR = 2.5, CI: 1.5-4.1, $p < .01$).</p> <p>The association between smoking susceptibility and flavored e-cigarette use was significantly higher for those who were not receptive to tobacco marketing (AOR = 5.0, CI: 3.5-7.0, $p < .01$) than those who were receptive (AOR = 2.5, CI: 1.2-3.1, $p < .05$).</p>
Chen, 2018[35]	<p>Longitudinal survey</p> <p>Probability sample</p>	<p>Univariate and multivariate regressions used to examine associations between past-year smoking reduction and cessation and current e-cigarette flavor use at wave 2.</p>	<p>Users of one non-tobacco/menthol flavor (37.1%) were more likely than non-e-cigarette users (24.7%) to adopt smoking cessation methods ($p < .001$).</p> <p>In adjusted analysis, wave 2 e-cigarette users who used one (AOR = 2.5, $p < .001$) or multiple (AOR = 3.0, $p < .001$) non-tobacco/menthol flavors were more likely to have reduced or quit smoking cigarettes in the past year than non-e-cigarette users.</p> <p>The third most endorsed reason for using e-cigarettes among current users (subsample of 844 respondents) were that e-cigarettes “come in flavors I like” (80.2%), behind “might be less harmful to people around me than cigarettes” (85.4%) and “can be used where smoking cigarettes is not allowed” (82.2%).</p>

			<p>Compared to users of tobacco/menthol flavors, users of non-tobacco/menthol flavors were more likely to enjoy e-cigarette flavors ($p < .001$) and to vape daily ($p < .001$).</p> <p>E-cigarette users who said that e-cigarettes “come in flavors I like” (OR = 2.1, $p = .007$) were more than twice as likely to have reduced or quit smoking in the past year compared to those who did not endorse e-cigarette use for this reason.</p>
Clarke, 2017[25]	<p>Cross-sectional survey</p> <p>Convenience sample</p>	<p>Sequential hierarchical multiple regression used to identify predictors of adolescents’ willingness to try flavored and tobacco-flavored e-cigarettes.</p>	<p>The majority of cigarette smokers (90.6%) were more willing to try flavored e-cigarettes than tobacco-flavored products (73.4%), with around one-third (33.9%) of non-smoking participants willing to try flavored e-cigarettes, as opposed to tobacco-flavored (12.0%).</p> <p>The more positively adolescents perceived a smoker, the more willing they were to try a flavored e-cigarette ($p < .05$), while the more negatively they perceived an e-cigarette user, the less willing they were to try a flavored e-cigarette ($p < .05$).</p>
Coleman, 2017[36]	<p>Cross-sectional survey</p> <p>Probability sample</p>	<p>Poisson regression used to examine association between everyday versus someday e-cigarette use and demographic, tobacco use, and product characteristics.</p>	<p>Never smokers were more likely to endorse appealing flavors as a reason for e-cigarette use (75.3%) compared with current (63.7%, $p < .0001$) and former (60.1%, $p < .0001$) smokers.</p> <p>Daily e-cigarette users were more likely to report that their first e-cigarette was non-tobacco flavored (65.2%) than moderate (60.7%) or infrequent (54.8%) e-cigarette users ($p < .0001$).</p>
Cooper, 2016[37]	<p>Cross-sectional survey</p> <p>Probability sample</p>	<p>Logistic regression models used to investigate relationship between perceptions of</p>	<p>27.0% of youth reported that flavored e-cigarettes were “less harmful” than non-flavored e-cigarettes.</p> <p>Youth who currently used e-cigarettes had higher odds (OR = 2.84, 95% CI:</p>

		harm and addictiveness and e-cigarette use.	<p>1.91–4.21) of reporting flavored e-cigarettes as “less harmful” than non-flavored e-cigarettes compared to non-current users, after adjusting for covariates.</p> <p>Youth who had ever used e-cigarettes had higher odds (OR = 2.88, 95% CI: 2.42–3.42) of reporting that flavored e-cigarettes were “less harmful” than non-flavored products compared to never users, after adjusting for covariates.</p>
Czoli, 2015[38]*	<p>Cross-sectional discrete choice experiment</p> <p>Convenience sample</p>	Multinomial logit regression was used to analyze the effect of attributes on consumer choice for each outcome in a discrete choice experiment.	<p>Participants were significantly more interested in trying e-cigarettes with cherry ($p < 0.0001$, $r = 0.2$) and menthol ($p = 0.01$, $r = 0.1$) flavors.</p> <p>Younger smokers expressed interest in trying e-cigarettes with a preference for products with cherry flavor ($p < .001$, $r = 0.2$) while younger nonsmokers indicated interest in trying cherry ($p < .0001$, $r = 0.3$), menthol ($p < .0001$, $r = 0.2$) and coffee flavor ($p < .001$, $r = 0.2$); Older smokers indicated greater interest in trying tobacco-flavored e-cigarettes ($p < 0.0001$, $r = 0.6$).</p> <p>E-cigarettes with the following characteristics were perceived as less harmful and greater quit efficacy: menthol ($p < 0.0001$, $r = 0.6$; $p < 0.0001$, $r = 0.2$) and coffee flavors ($p < 0.0001$, $r = 0.3$; $p < 0.001$, $r = 0.2$).</p> <p>Younger non-smokers were more likely to perceive coffee-flavored ($p = 0.02$, $r = 0.1$) e-cigarettes as less harmful while younger smokers held these beliefs about products with cherry flavor ($p = 0.03$, $r = 0.1$); Older smokers perceived products with tobacco flavor ($p < 0.001$, $r = 0.2$) as less harmful.</p>

			Compared to other attributes, flavor accounted for 24% of the relative importance on intention to try, 36% for perceptions of reduced product harm, and 25% on perceptions of enhanced product quit efficacy.
Dai, 2016[39]	Cross-sectional survey Probability sample	Logistic regression model used to examine associations between flavored e-cigarette use and tobacco use and perception of tobacco's danger.	<p>Among all respondents, students who reported using flavored e-cigarettes were least likely to perceive tobacco's danger compared with those who reported not using e-cigarettes (74.8% vs 91.3%; aOR = 0.5; p<.0001) or with those who reported using non-flavored e-cigarettes (74.8% vs 77.1%).</p> <p>Among never smokers, the use of flavored e-cigarettes was associated with a higher prevalence of intention to initiate cigarette use compared with those who had not used e-cigarettes in the past 30 days (58.3% vs 20.1%; aOR = 5.7; p<.0001) or with those who had used non-flavored e-cigarettes (58.3% vs 47.4%; aOR = 1.7; p=.02).</p> <p>Among current smokers, students who reported using flavored e-cigarettes were less likely to quit tobacco use compared with those who reported not using e-cigarettes (24.1% vs 32.7%; aOR = 0.6; p=.006) or with those who had used non-flavored cigarettes (24.1% vs 33.5%).</p>
Elkalmi, 2016[40]	Cross-sectional survey Convenience sample	Descriptive statistics used to report frequencies.	66.7% of respondents who had tried e-cigarettes in the past reported that variety of flavors contribute to better enjoyment of e-cigarettes compared to traditional cigarettes.
Etter, 2010[41]*	Cross-sectional survey Convenience sample	Open-ended questions about the most positive and negative points about e-cigarettes were analyzed.	The most frequently cited positive feature of e-cigarettes was that respondents liked the taste and variety of flavors (18% of total open-ended comments).

Etter, 2016[42]	Cross-sectional survey Convenience sample	T-tests used to compare means, Mann-Whitney U-tests and Wilcoxon's signed-ranks test to compare medians between or within groups, and chi-square tests to compare proportions.	Tobacco flavor e-cigarettes were used by 44% of users who had recently started vaping (i.e. those who had used e-cigarettes for 0–3 months) versus 25% of long-term users (who had used e-cigarettes for ≥ 4 months, $\chi^2 = 79.0$, $p < .001$). Most participants (80%) said that the e-cigarette flavors helped them either to quit smoking or reduce their cigarette consumption, while 18% said that the flavors had no impact on their smoking and 2% said that the flavors made them want to smoke.
Farsalinos, 2013[43]*	Cross-sectional survey Convenience sample	X ² tests compared categorical variables (e.g., type of e-cigarette flavors regularly used) between current and former smokers. A stepwise binary logistic regression analysis was used with smoking status (former vs current smoker) as the independent variable and age, gender, education level, smoking duration, number of flavorings used regularly, and e-cigarette consumption as covariates.	More current smokers were using tobacco flavors compared to former smokers ($X^2=14.6$, $p < .001$), while more former smokers were using fruit ($X^2=14.0$, $p < .001$) and sweet flavors ($X^2=21.8$, $p < .001$). The average score for importance of flavors variability in reducing or quitting smoking was 4 (“very important”) on a 5-point scale. 39.7% of participants reported that restricting variability of flavors would make reducing or completely substituting smoking less likely. Binary logistic regression analysis showed that number of flavors regularly used ($\beta=0.089$, $p=0.038$) was associated with complete smoking abstinence among dedicated long-term users.
Farsalinos, 2014[44]*	Cross-sectional survey Convenience sample	Descriptive statistics examined reasons for initiating e-cigarette use.	Initiating e-cigarette use to enjoy the variability of flavors in e-cigarettes was ranked as 3 on a 5-point scale from 1 (not important) to 5 (most important).

Ford, 2016[45]*	Cross-sectional survey Probability sample	Paired t-tests were run on weighted data to produce mean scores; the Friedman test was used on ordinal data, then post hoc tests were conducted using the Wilcoxon signed rank test	<p>Perceptions of harm from the different flavors ranged from a mean of 3.00 (SD = 1.35) for candy floss flavor to 3.06 (SD = 1.29) for cherry, 3.47 (SD = 1.22) for coffee and 3.99 (SD = 1.14) for tobacco flavor.</p> <p>Perceptions of harm differed depending on the flavor, $\chi^2(4) = 851.59$, $p < 0.001$. Post hoc analysis showed that, when compared against perceptions of harm of e-cigarettes in general, tobacco flavor e-cigarettes were perceived as being more harmful ($p < 0.001$) while cherry and candy floss flavors were each perceived as less harmful ($p < 0.001$). Coffee flavor e-cigarettes were perceived as having the same level of harm as e-cigarettes in general.</p> <p>Perceptions of likelihood of an adult smoker using each differed depending on the flavor, $\chi^2(3) = 153.9$, $p < 0.001$ as did perceptions of likelihood of a never smoker of their age, $\chi^2(3) = 879.01$, $p < 0.001$. Post hoc analysis showed that, when compared with tobacco flavor e-cigarettes, adult smokers who were trying to give up smoking were perceived by youth to be less likely to use cherry, candy floss or coffee flavors ($p < 0.001$). Conversely, a never smoker of their age was perceived to be more likely to try cherry ($p < 0.001$), candy floss ($p < 0.001$) or coffee flavor ($p < 0.01$) than a tobacco flavor e-cigarette.</p> <p>An adult smoker was perceived by youth to be more likely than a never smoker of their age to use tobacco ($p < 0.001$) and coffee ($p < 0.001$) flavors whereas a never smoker of their age was perceived to be more likely than an</p>
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			adult smoker to try candy floss (p<0.001) and cherry (p<0.01) flavors.
Goldenson, 2016[46]	Cross-sectional laboratory experiment Convenience sample	Multilevel linear models used to examine associations between each sensory rating (sweetness or throat hit) and appeal outcomes.	A significant main effect of e-liquid flavor was found for each appeal outcome (i.e., liking, willingness to use again, and amount willing to pay) and sweetness (ps<.0001). Sweet-flavored e-liquids resulted in higher appeal ratings than non-sweet and flavorless solutions (ps<.0001). Ratings of sweetness were positively associated with each appeal outcome (ps<.0001). For instance, each one-point increase in sweetness rating (0-100) was associated with a 0.51 increase in liking, a 0.51 increase in willingness to use again, and a \$0.04 increase in amount willing to pay for a day's worth of the solution.
Gubner, 2017[47]	Cross-sectional survey Convenience sample	Bivariate analyses and logistic regression used to examine factors associated with daily vs. weekly e-cigarette use.	Daily and weekly e-cigarette users both reported similar reasons for use of e-cigarettes, including because they have good flavors (41.1% overall). Daily e-cigarette users reported using more types of e-juice flavors (2.2 ± 1.3 vs. 1.8 ± 1.4), $t(168) = 2.15$, $p=.03$), and were more likely to have used tobacco flavor, fruit/berry flavor, or select "other" flavor compared to weekly users.
Harrell, 2017a[48]	Cross-sectional survey Probability and convenience sample	Proportions and 95% confidence intervals used to examine percentage of flavored e-cigarette use at initiation and current use; Chi-square tests used to examine differences in flavored e-cigarette use by combustible	The proportion of current e-cigarette users who initiated with an e-cigarette flavored with something other than tobacco was considerably higher in Texas youth (98.6%) and young adults in Texas (95.2%) and nationwide (71.2%) compared to older adults nationwide (44.1%). At initiation, the use of tobacco-flavored e-cigarettes was more common among current dual users (e-cigarette and combustible tobacco product users)

		tobacco product use and demographic characteristics.	<p>than exclusive e-cigarette users (i.e., former combustible tobacco product users), for both age groups ($p < .05$). Among adults nationwide, 43.5% of current combustible users said their first e-cigarette was flavored to taste like tobacco, compared to 27.8% of former combustible product users.</p> <p>The proportion of current users whose “usual” e-cigarette was flavored with something other than tobacco was higher for Texas youth (97.9%) and young adults (96.7%) in Texas and nationwide (82.2%) compared to older adults nationwide (69.3%).</p> <p>Among current e-cigarette users, more Texas youth (72.9%) than young adult college students in Texas (57.4%) and young adults (64.8%) and adults (54.0%) nationwide cited using e-cigarettes because they “come in flavors I like.”</p>
Harrell, 2017b[49]	<p>Cross-sectional survey</p> <p>Probability sample (youth) and convenience sample (young adults)</p>	Chi-square tests used to test for differences between subgroups (sex and school/age level).	<p>Roughly 3 out of every 4 youth (78%) and young adult (74%) flavored e-cigarette users said that they would not use an e-cigarette if it was not available in a flavored form (e.g., candy, fruit, mint/menthol).</p> <p>Significantly more young adult females than males reported that they would not use e-cigarettes if it were not flavored (77% vs 69%, $p = .03$).</p>
Kim, 2016[50]	<p>Cross-sectional laboratory experiment</p> <p>Convenience sample</p>	One-way analysis of variance (ANOVA) used to examine differences between e-cigarette flavors in hedonic ratings and sensory attribute ratings; regression models used to examine	<p>In terms of mean hedonic (liking/disliking) ratings of the 6 e-cigarette flavors, Pina Colada was liked significantly more than Classic Tobacco ($p < .05$).</p> <p>One-way ANOVAs found a significant main effect of e-cigarette flavors on sweetness ($F = 14.56$, $p < .0001$), coolness ($F = 11.96$, $p < .00001$), and bitterness ($F = 3.56$, $p < .01$), but not on</p>

		relative effects of flavor attributes on hedonic ratings.	<p>harshness and own flavor. The four non-tobacco flavored e-cigarette samples were rated significantly sweeter than Classic Tobacco.</p> <p>Pina Colada was perceived as sweetest and liked the most; Classic Tobacco was perceived as least sweet and liked the least. Hedonic ratings were significantly positively correlated for sweetness for Pina Colada ($r = 0.36$, $p < .05$) and Peach Schnapps ($r = 0.56$, $p < .05$).</p> <p>Hedonic ratings were significantly positively correlated with coolness for Classic Tobacco, Magnificent Menthol, and Vivid Vanilla ($r = 0.41-0.52$, $p < .05$).</p> <p>Harshness ratings were significantly negatively correlated with hedonic ratings for Cherry Crush, Pina Colada, and Peach Schnapps ($r = 0.37-0.40$, $p < .05$).</p> <p>When regressing sensory attributes on hedonic ratings, sweetness and coolness had a positive contribution to liking and disliking of the six e-cigarette flavors, while bitterness and harshness had a negative contribution.</p>
Kinouani, 2017[51]	Cross-sectional survey Convenience sample	Descriptive statistics used to describe reasons for trying e-cigarettes among current and former e-cigarette users, stratified by smoking status.	<p>24.6 % of respondents reporting trying e-cigarettes because of the flavor, behind reasons of curiosity (77.4%) and because someone offered one to try (63.5%); there was no significant difference between men and women using for this reason (20.7% and 26.0%, respectively; $p = .07$).</p> <p>28.6% of former smokers, 25.1% of current smokers, and 17.8% of never smokers tried e-cigarettes because of flavors.</p>

Kong, 2014[52]*	Cross-sectional survey Convenience sample	X ² tests evaluated school level differences (middle school, high school, college) on all variables. Multinomial logistic regression analyses evaluated the extent to which reasons for e-cigarette experimentation differed based on cigarette smoking status.	43.8% of respondents reported the availability of flavors as a reason for experimentation with e-cigarettes. School level differences were observed (X ² (2,N=1,157)=18.63, p≤.001), with high school students more likely to experiment with e-cigarettes because of appealing flavors compared to college students (47.0% vs 32.8%, X ² (1,N=1,116)=13.61, p≤.001).
Krishnan-Sarin, 2014[53]*	Cross-sectional survey Convenience sample	Descriptive statistics explored flavors of e-cigarettes that had been tried and preferred.	Most lifetime e-cigarette users in middle school and high school, across cigarette smoking status, reported that they had tried and preferred sweet flavors compared to menthol and tobacco flavors.
Lee, 2017[54]	Cross-sectional survey Convenience sample	Multinomial logistic regression models and Heckman two-step selection procedures used to examine determinants that promote e-cigarette use acceptability.	A higher preference for the availability of flavors in e-cigarettes increased intention to use e-cigarettes (OR = 1.49) and likelihood of currently using e-cigarettes (OR = 1.82).
Lee, 2017b[55]	Cross-sectional survey Probability sample	Chi-square tests used to assess association between reason for using e-cigarettes and frequency of use.	9.3% of respondents reported using e-cigarettes “since they have good flavor,” behind reasons of curiosity (22.9%), being potentially less harmful (18.9%), for smoking cessation (13.1%), for indoor use (10.7%), or being better tasting (9.6%).
Litt, 2016[56]	Two-phase longitudinal laboratory study	Multilevel modelling with maximum likelihood estimation used to evaluate effects of	The largest drop in cigarette smoking occurred among those assigned menthol e-cigarettes (smoking 4.0 per day by week 7), and the smallest drop in smoking occurred among those assigned cherry and chocolate flavors

	Convenience sample	assigned e-cigarette flavor on use of usual cigarettes and e-cigarettes over 6-week study period.	(smoking 9.8 per day by week 7) (contrast: menthol vs all others: $F(1, 3143) = 2.48; p < .05$). E-cigarette vaping rates differed significantly by flavor assigned, with the highest vaping rates (about 12.3 vaping episodes per day) for tobacco e-cigarettes and the lowest rates for those assigned to chocolate (8.6 episodes per day) (contrast: tobacco vs chocolate: $F(1, 3143) = 3.86; p < .001$).
Maglalang, 2016[57]	Cross-sectional survey Convenience sample	Frequencies reported for preferred e-cigarette flavors and reasons for e-cigarette use.	Among current e-cigarette users who responded to the question ($n=39$), 8% cited “enjoying the flavor” as a reason for using e-cigarettes. This ranked the lowest behind use as a cessation aid or healthier alternative to conventional cigarettes; use for recreational/social reasons; use for stress relief/coping; and use for nicotine's highs.
Morean, 2018[58]	Cross-sectional survey Convenience sample	Chi-squares and independent samples t-tests used to examine differences in sex, age, smoking status, e-cigarette nicotine content, e-liquid flavor preferences, the total number of e-liquid flavors preferred, and e-cigarette use frequency; univariate general linear modeling used to examine associations between flavor preferences and total number of flavors preferred with e-cigarette use frequency	The most commonly preferred flavors among adults were fruit (40.0%), tobacco (32.0%) and menthol/mint (27.6%). Compared to adolescents, a larger percentage of adult e-cigarette users preferred tobacco, menthol/mint, coffee (16.6%), and spice (12.2%) flavor e-liquids. Adults preferred a greater total number of e-liquid flavors than did adolescents ($M = 15.56, SD = 12.48$ among adults compared to $M = 9.98, SD = 10.52$ among adolescents). The most commonly preferred flavors among adolescents were fruit (52.3%), candy/dessert (16.2%), and vanilla (11.4%). Compared to adults, more adolescents preferred fruit, alcohol (9.8%), and “other” flavored (2.0%) e-liquids or reported not knowing what their preferred flavor was (15.4%).

		among adolescents and adults separately.	<p>Adolescents who preferred to use fruit ($\eta^2 = 0.02$, $p = .003$), dessert ($\eta^2 = 0.02$, $p=.007$), and/or alcohol flavored e-liquids ($\eta^2 = 0.02$, $p=.002$) reported using e-cigarettes more frequently.</p> <p>Among adolescents, the total number of e-cigarette flavors preferred was associated with e-cigarette frequency; preferring to use a greater number of e-cigarette flavors was associated with using e-cigarette on more days in the past month ($\eta^2 = 0.04$, $p<.001$).</p>
Nonnemaker, 2016[59]*	Cross-sectional survey Convenience sample	Calculated coefficients and corresponding 95% CIs for a series of multivariate linear regression models; regressed indicators for each characteristic on respondents' reported willingness to pay for an e-cigarette with a specific set of attributes	<p>Among the full sample, removing the attribute "coming in flavors" significantly reduced the price respondents were willing to pay for an e-cigarette ($p<0.05$).</p> <p>Among cigarette-only users, losing the attribute "coming in flavors" significantly reduced the price respondents were willing to pay for an e-cigarette ($p<.01$); this relationship was not significant for dual users.</p>
Patel, 2016[60]	Cross-sectional survey Probability sample	Wald tests and multivariate Poisson regressions used to assess differences in reasons for e-cigarette use across respondent characteristics.	<p>Flavoring was the 5th most reported reason for using e-cigarettes (34.4%), behind cessation/health, consideration of others, convenience, and curiosity.</p> <p>Current e-cigarette users aged 18 to 24 years (adjusted prevalence ratio [aPR] = 2.02, 95% CI: 1.60–2.55), 25 to 34 years (aPR = 1.61, 95% CI: 1.30–2.01), and 35 to 54 years (aPR = 1.29, 95% CI: 1.08–1.54) were more likely to cite flavoring as a reason for use than those aged 55 years or older.</p> <p>The prevalence of citing flavoring as a reason for use was greater among current e-cigarette users living in the</p>

			<p>South than those in the Northeast (aPR = 1.36, 95% CI: 1.01–1.83).</p> <p>Compared with current e-cigarette users who used disposables the most, tank users had a greater odds of citing flavoring as reason for use (aPR = 2.55, 95% CI: 1.97–3.32).</p>
Pepper, 2013[61]*	<p>Cross-sectional survey</p> <p>Probability sample</p>	<p>Logistic regression examined willingness to try any kind of e-cigarette (plain, flavored, or both).</p>	<p>The same proportion of respondents were willing to try plain e-cigarettes or to try flavored e-cigarettes (p=.15).</p>
Pepper, 2014[62]*	<p>Cross-sectional survey</p> <p>Probability and convenience sample</p>	<p>Descriptive statistics assessed reasons for first trying e-cigarettes.</p>	<p>Less than 10% of respondents reported starting e-cigarette use because “e-cigarettes come in flavors they like.”</p>
Pepper, 2016[63]	<p>Cross-sectional survey</p> <p>Probability sample</p>	<p>Logistic regression models used to examine the effects of flavor condition on interest in trying e-cigarettes; linear regression models used to assess association between flavor and perceived harm.</p>	<p>Adolescents perceived fruit-flavored e-cigarettes to be less harmful than tobacco-flavored ones (mean 2.71 vs. 2.87, $\beta = -0.08$, $p < .05$).</p> <p>Adolescents reported that, if offered by a friend, they were more likely to try menthol-flavored (8.3%, OR = 4.00, 95% CI 1.46-10.97), candy-flavored (9.3%, OR = 4.53, 95% CI: 1.67-12.31) or fruit-flavored e-cigarettes (12.8%, OR = 6.49, 95% CI: 2.48-17.01) compared with tobacco-flavored e-cigarettes (2.2%).</p> <p>Perceptions of e-cigarette harm partly mediated the relationship between flavor and interest in trying e-cigarettes. Adolescents believed that menthol-flavored, candy-flavored or fruit-flavored e-cigarettes were less harmful than tobacco-flavored or alcohol flavored ones ($\beta = -0.15$, $p < .01$). Greater perceived harmfulness was</p>

			associated with less interest in trying e-cigarettes (OR = 0.31, 95% CI: 0.22-0.43).
Pesko, 2016[64]	Cross-sectional discrete choice experiment Convenience sample	Linear probability model estimated probability of choosing the e-cigarette option as a function of indicator variables for each attribute level.	<p>Increased flavor availability increased e-cigarette selection for younger adults, from 17.5% to 21.9% (p<.001) but was not associated with a significant increase for older adults.</p> <p>Increased flavor availability increased e-cigarette selection for individuals that have not used vaping devices in the past month (p<.001) but was not associated with a significant increase in e-cigarette selection for individuals that have.</p> <p>Regardless of interest in quitting cigarettes, greater flavor availability increased e-cigarette selection.</p> <p>In linear probability models, greater flavor availability was associated with a 2.1 percentage point increase in e-cigarette selection (p<.001). In the interaction model, young adults were 3.7 percentage points more likely to choose e-cigarettes when multiple flavors were available compared to older adults (p<.001).</p>
Russell, 2018[65]	Cross-sectional survey Convenience sample	Chi-square tests used to compare prevalence of first e-cigarette flavor purchased for each time period of first e-cigarette purchase; logistic regression analysis used to examine association between current use of tobacco-flavored e-liquids and fruit/fruit beverage flavored	<p>Switchers (from regular cigarette smoking to regular e-cigarette use) (OR = 4.03, 95% CI: 3.26-4.97), dual users (OR = 4.14, 95% CI: 3.26-5.26), and former smokers (OR = 2.33, 95% CI: 1.85-2.93) were more likely than never smoker e-cigarette users to have initiated e-cigarette use with a tobacco-flavored product.</p> <p>Switchers (OR = 0.43, 95% CI: 0.38-0.49), dual users (OR = 0.41, 95% CI: 0.34-0.48), and former smoker (OR = 0.58, 95% CI: 0.50-0.67) e-cigarette users were all significantly less likely than never smoker e-cigarette users to</p>

		<p>e-liquids and Tobacco Use Pathway Group and time of first e-cigarette purchase.</p>	<p>have initiated e-cigarette use with fruit-flavored products.</p> <p>The highest rate of current use of tobacco-flavored e-liquid was reported by those who initiated e-cigarette use \geq 5 years ago; the lowest rate of current use of tobacco flavor was reported by those who initiated e-cigarette use in the past 12 months.</p> <p>The highest rate of current use of fruit/fruit beverage e-liquid flavors was among those who initiated e-cigarette use in the past 12 months, while the lowest rate was among those who initiated e-cigarette use \geq5 years ago; a similar effect of time since first e-cigarette purchase was found for current use of dessert/pastry flavors and for candy/chocolate/sweets flavors.</p> <p>As was observed for tobacco-flavored first e-cigarette purchases, switchers (OR = 2.18, 95% CI: 1.69-2.81), dual users (OR = 2.63, 95% CI: 1.97-3.51), and former smoker (OR = 1.54, 95% CI: 1.16-2.03) e-cigarette users all had significantly higher odds of current use of tobacco-flavored e-liquid compared to never smoker e-cigarette users.</p> <p>Switchers (OR = 0.64, 95% CI: 0.54-0.75), dual users (OR = 0.70, 95% CI: 0.57-0.86), and former smoker (OR = 0.70, 95% CI: 0.59-0.85) e-cigarette users were significantly less likely than never smoker e-cigarette users to be current users of fruit-flavored products.</p>
Rutten, 2015[66]	<p>Cross-sectional survey</p> <p>Probability sample</p>	<p>Logistic regression models used to assess association between reasons for use of e-cigarettes smoking</p>	<p>14.7% of smokers who also used e-cigarettes reported using e-cigarettes because of appealing flavors, behind eight other reasons including to quit smoking (58.4%), reduce smoking (57.9%), and to reduce the health risks of smoking (51.9%).</p>

		reduction behaviors.	Smoking reduction behaviors (i.e., decreased use of cigarettes or considered quitting) did not vary among those reporting using e-cigarettes because of appealing flavors vs. those that did not report using e-cigarettes because of appealing flavors.
Shang, 2017[67]	Cross-sectional discrete choice experiment Probability sample	Conditional logit regressions used to analyze the effects of flavors, warnings, and device types on the choice of using e-cigarettes.	For both e-cigarette ever and never users, fruit/sweets/beverage flavors marginally significantly increased ($p < .01$) the probability of choosing an e-cigarette product compared to tobacco flavor.
Shiffman, 2015[68]*	Cross-sectional survey Convenience sample	Comparisons of teen and adult respondents' ratings of their interest by flavor and comparisons of ratings by flavor within the adult sample by e-cigarette use status (recent user, past user, never user).	Adult smokers' e-cigarette ratings (overall mean=1.73±1.0 on a 0-10 scale) were significantly higher ($p < .0001$) than non-smoking teens' (overall mean=0.41±0.14) for each e-cigarette flavor. For each of the 15 flavors, adult smokers' interest in trying e-cigarettes was significantly higher than non-smoking teens' interest (all p values $< .05$, most p values $< .0001$).
Shiplo, 2015[69]*	Cross-sectional survey Convenience sample	Logistic regression models examined factors associated with use of flavors	Among current e-cigarette users, a common reason for use was taste (32.3% of younger non-smokers, 18.4% of younger smokers, 6.5% of older smokers).
Spears, 2018[70]	Cross-sectional survey Probability sample	Rao-Scott chi-square tests, independent samples t-tests of mean differences, and ordinal logistic regression used to examine associations between mental health condition	Compared to former smokers without mental health conditions, former smokers with mental health conditions gave higher importance ratings for appealing flavors as a reason for use ($t[79] = 3.83$, $p = .0001$).

		and variables of interest.	
Tackett, 2015[71]*	Cross-sectional survey Convenience sample	Descriptive statistics examined preferred e-liquid flavors. Logistic regression, controlling for age and sex, was performed to assess associations between flavor (traditional tobacco/menthol vs non-traditional e.g., fruity, coffee, candy) on participants' biochemically verified smoking status.	E-cigarette users who reported using non-tobacco and non-menthol flavors were more likely to have quit smoking compared to those who vaped traditional (tobacco/menthol) flavors (OR=2.626, 95% CI=1.133-6.085, p=.024).
Tsai, 2018[72]	Cross-sectional survey Probability sample	Chi-square tests used to assess differences in reasons for e-cigarette use across groups.	Among students who reported ever using e-cigarettes, the second most commonly selected reason for use was availability of flavors such as mint, candy, fruit, or chocolate (31.0%), behind use by friend or family member (39.0%). High school students were more likely than middle school students to report the availability of flavors as a reason for e-cigarette use (32.3% vs. 26.8%, respectively; p<.05).
Vasiljevic, 2015[73]*	Cross-sectional survey Convenience sample	Mann-Whitney tests and logistic regression were used to assess exposure to advertisements and increase in ratings of appeal, interest in buying and trying e-cigarettes.	Exposure to the flavored e-cigarette ads increased interest in buying and trying e-cigarettes (Mann-Whitney test, U=9140.000, Z=-3.949, p<0.001), whereby those who saw the flavored e-cigarette ads expressed greater interest in buying and trying e-cigarettes (mean rank=176.44) than those who saw the non-flavored e-cigarette ads (mean rank=136.26).

		Logistic regression was also used to examine exposure to advertisements and effects on susceptibility to smoking.	
Weaver, 2018[74]	Longitudinal survey Probability sample	Weighted logistic regression or weighted general linear models used to assess associations between e-cigarette use and outcomes, such as making a smoking quit attempt and 30-day smoking abstinence; both a complete-case analysis and a multiple-imputation approach used to account for missing data.	Among baseline daily smokers, both menthol/wintergreen/mint users and other flavor e-cigarette users were more likely to report a quit attempt (AORs = 6.0 and 2.4, respectively) than non-users of e-cigarettes, and menthol/wintergreen/mint users were more likely to report a quit attempt than tobacco/unflavored e-cigarette users in the past year ($p < .05$). Users of other e-cigarette flavors (e.g., fruit, dessert, spice; 8.8%; AOR = 0.22, 95% CI: 0.08–0.59) had significantly lower adjusted odds of quitting than non-users of e-cigarettes in the past year, which remained significant in multiple imputation analysis.
Yingst, 2015[75]*	Cross-sectional survey Convenience sample	T-tests and X^2 tests were used to identify differences between current first generation device (FGD) and advanced generation device (AGD) users. Descriptive statistics examined how respondents transitioned between devices.	Participants using an AGD were more likely to rate variety of flavor choices as important (FGD 54.6% vs AGD 94.9%, $p < .0001$).