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E-Cigarette Use among Individuals Diagnosed with an Eating Disorder

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## Abstract

**BACKGROUND.** E-cigarette use has increased exponentially in recent years. Prior research suggests that some adult e-cigarette users vape to lose weight. The current study examined whether rates of vaping to lose weight are elevated among American adults diagnosed with an eating disorder (i.e., Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, or Other Specified Feeding or Eating Disorder [OSFED]). **METHODS.** American adult e-cigarette users who reported vaping at least weekly and who either had a history of an eating disorder ( $n = 205$ ; 86.3% with a current diagnosis, 75.2% female, 83.0% White, 33.54 [SD = 8.90] years, 71.4% cigarette smokers) or no history of an eating disorder ( $n = 433$ ; 54.7% female, 83.4% White, 38.98 [SD = 11.71] years, 73.9% cigarette smokers) completed an online survey. **RESULTS.** Participants with a current eating disorder were more likely to endorse vaping to lose weight, vaping for appealing flavors, and vaping because it can be concealed easily from others than were participants with no eating disorder history. Participants with a current eating disorder also reported vaping more frequently overall and using higher e-liquid nicotine concentrations than individuals with no eating disorder history. Among individuals with no eating disorder history, vaping frequency was associated with nicotine content, menthol flavor, and negative reinforcement. Among individuals with a current eating disorder, vaping frequency was associated with nicotine content, mint or vanilla flavored e-liquid, positive reinforcement, and appetite/weight control. **CONCLUSIONS.** Individuals currently diagnosed with an eating disorder disproportionately reported vaping to lose weight, vaping to conceal it from others, and experiencing positive reinforcement through using appealing flavors. They also vaped more frequently overall and used higher levels of nicotine, raising health concerns within this already vulnerable population. The current results suggest that assessing and monitoring e-cigarette use should be incorporated into existing eating disorder treatments.

### E-Cigarette Use among Individuals Diagnosed with an Eating Disorder

The popularity of e-cigarettes has increased rapidly in recent years among Americans of all ages (King et al., 2014). Numerous motivations for using e-cigarettes have been identified, many of which have focused on the potential benefits associated with vaping versus smoking (e.g., vaping as a less harmful alternative to smoking; vaping as a potential smoking cessation tool; Etter & Bullen, 2011). However, motivations for vaping that are applicable to non-smokers have been identified only recently (e.g., Morean & Wedel, 2017). Of central importance to the current study, 13.5% of an online community sample of e-cigarette users reported currently vaping to lose or manage their weight (Morean & Wedel, 2017). However, individuals who have diagnosed eating disorders (i.e., Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Other Specified Feeding or Eating Disorder [OSFED]) may be at increased risk for vaping for weight-related reasons.

Over 30 million Americans have been diagnosed with an eating disorder in their lifetime (Wade et al., 2011). Eating disorders are associated with the highest mortality rate of all psychological disorders (Harrop & Marlatt, 2010), and often are comorbid with other forms of psychopathology. For example, alcohol use disorder and other substance use disorders (including nicotine) are four times more prevalent in individuals with eating disorders than within the general population (Harrop & Marlatt, 2010). Individuals with eating disorders often engage in harmful weight-loss strategies, which sometimes include cigarette smoking (American Psychological Association, 2013; White, 2012). Elevated smoking rates among individuals with eating disorders are linked to two key features of tobacco use. First, cigarettes contain nicotine, an appetite-suppressant that curbs cravings (Chiolero et al. 2008; Kluger, 1996) and increases daily calorie expenditure by approximately 200 calories via increasing resting metabolic rate

(Audrain-McGovern & Benowitz, 2011). Second, the behavior of smoking a cigarette can serve as a distraction from or substitute for eating (Kovacs et al., 2014). It is possible that vaping may appeal to individuals with eating disorders because it provides the same nicotine and behavioral “benefits” as smoking while being perceived as a healthier alternative. Furthermore, e-cigarettes are available in a plethora of flavors that often mimic the types of high calorie or high fat foods and beverages that individuals with eating disorders either avoid eating or consume during binge eating episodes (e.g., candies, desserts, alcohol).

Currently there is no published scientific research on the use of e-cigarettes by individuals diagnosed with eating disorders. However, other sources of anecdotal information are available, including numerous pro-eating disorder websites where users post tips about how to “successfully” lose and manage weight. A review of online eating disorder forums revealed that at least a subset of individuals with eating disorders are using e-cigarettes for weight-related reasons. For example, one website called *ProAnaPrincessClub* published a post titled “Vapor Pen and E-Cigs....Throw out the cigarettes” endorsing e-cigarette use:

Smoking.... it is our best friend yet worse nightmare...Smoking helps us by taking away our appetite as well as releasing stress, which is probably one of the best things ever for those who want to lose weight. Although smoking helps us out and makes life easier, it causes wrinkles and increases aging, which is the nightmare part. We want to be pretty and thin, smoking helps us to be thin but in the long run ruins our teeth, our voices, and makes us look ugly in the face by destroying our skin. Thanks to technology we now have the PERFECT alternative (Andrea, 2016).

This is just one of many Pro-eating disorder sites on the Internet that are advocating for the use of e-cigarettes as a weight loss strategy. Of note, many forums hosted posts that referenced flavors as being helpful in managing food cravings, urges to binge, or serving as a food substitute. For example, one user posted that “e-cigs keep my mouth busy doing something and they satisfy my sweet tooth. This means I don't feel like hunting down a jar of Nutella or cookies

or chocolate bars” (Kiminokokoro, 2015). Another user posted a statement that highlights the link between flavors and bingeing even more explicitly: “I use piña colada, watermelon, strawberry, and blueberry flavors to avoid bingeing. Sweet flavors *DEFINITELY* help me avoid bingeing, especially for sweet foods” (Prismaticspirit, 2015).

In addition to pro-eating disorder websites, numerous e-cigarette companies host online advertisements that target weight-related vaping motives. For example, an advertisement for the company *Vaportrim* presents users with a choice between eating a cupcake (“320 calories [and a] 45 minute jog”) or vaping a cupcake flavored e-cigarette (“0 calories [and] 0 regrets;” Spooky, 2016). Similar advertisements play into the specific type of guilt that is experienced after a person engages in a binge episode (i.e., ‘post binge regrets’); products are accompanied by slogans like, “Zero calories, Zero guilt, Tastes like you’re eating your favorite foods” (Vapor Diet, 2013) and “Inhale, Indulge, Lose Weight” (Pleasure Builder, 2014). Of note, the Federal Drug Administration (FDA) currently does not regulate these types of e-cigarette advertisements, which are reaching potentially vulnerable populations like individuals with eating disorders and youth.

In sum, existing research on cigarette smoking and vaping motives (within a community sample) as well as anecdotal evidence obtained online suggests that individuals with eating disorders are using e-cigarettes for weight-related reasons. To address the gap in the current scientific research literature, the present study examined rates of vaping as a means of weight loss in a sample of American adult e-cigarette users with a history of an eating disorder and in a comparison sample of “healthy” adult e-cigarette users with no history of an eating disorder. Individuals with a current diagnosis of an eating disorder were expected to endorse vaping to lose weight more often than individuals without eating disorders (both individuals with a lifetime

history of eating disorders and with no history of eating disorders). The current eating disorder group also was expected to use higher concentrations of nicotine than individuals never diagnosed with an eating disorder due to nicotine's appetite suppressant and weight loss effects (Chiolero et al. 2008; Kluger, 1996). Because individuals diagnosed with eating disorders often have a preoccupation with harm avoidance and secrecy (Kazlouski et al., 2011), they also were expected to endorse vaping because it is easy to conceal or hide at higher rates than individuals without eating disorders. Finally, individuals diagnosed with eating disorders were expected to endorse vaping due to the availability of flavors that mimic high calorie or fatty foods and beverages more frequently, and consequently, to report higher positive reinforcement from vaping than adults without eating disorders.

Additional analyses focused on assessing potential differences among the specific eating disorder diagnoses assessed in the current study (i.e., Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, OSFED). Individuals diagnosed with Anorexia Nervosa were expected to endorse vaping because it is easy to hide or conceal from others at higher rates than individuals with other eating disorders due to the tendency of individuals with Anorexia Nervosa to have the highest preoccupation for secrecy (Kazlouski et al., 2011). In addition, individuals with eating disorders that are restrictive in nature (i.e., Anorexia Nervosa, Bulimia Nervosa) were expected to endorse preferences for flavors that are not closely related to restricted foods (e.g., mint, coffee) at higher rates than their counterparts due to a characteristic fear of loss of control over eating and/or disinterest in flavors all together (Hill et al., 2012). In other words, individuals who restrict their consumption of high-calorie or high-fat foods may avoid vaping corresponding flavors due to a fear that they may lose control and consume the actual calorie- or fat-laden foods.

In addition to the primary study hypotheses, each of the central study variables (i.e., demographics [sex, age, and race], vaping consequences, nicotine use, and flavor preferences) was examined in relation to vaping frequency. No *a priori* hypotheses were made about the model in which all predictors were included simultaneously given the nascent nature of the current line of research.

### Methods

**Participants.** Two hundred five American adults (ages 18 and older) who reported vaping at least once a week and having a lifetime diagnosis of an eating disorder completed an anonymous online survey (75.2% female, 83.0% White, mean age 33.54 [SD = 8.90] years, 71.4% current cigarette smokers; 86.3% with a current eating disorder diagnosis). In addition, a comparison sample of 433 American adults (ages 18 and older) who reported currently vaping at least once a week but who reported no lifetime history of an eating disorder completed the survey (54.7% female, 83.4% White, mean age 38.98 [SD = 11.71] years, 73.9% current cigarette smokers).

**Procedures.** All study procedures were approved by the Oberlin College IRB. Participants were recruited and compensated directly through Qualtrics Online Research Panels (*Qualtrics, Inc.*), a commercially available service that recruits registered market research panel members to participate in research studies. Qualtrics Online Research Panels sent targeted emails to market research panel members who would be most likely to qualify for the study (e.g., health and disease-focused panels). Panel members who were interested in participating in the study clicked on a link that was embedded in the email. The link directed them to a series of study eligibility questions (see Measures section for details). Eligible individuals who wished to participate in the survey then completed the study consent form and were directed to the full

survey. Upon completing the survey, participants were compensated directly through the market research panels based on the terms and agreements associated with being a panel member. As is typical of these agreements, compensation comprised a combination of money (not to exceed \$10) and points that participants accrue to obtain products and services (e.g., gift cards, hotel rooms, airfare).

### **Measures.**

**Eligibility Questions.** To help disguise the purpose of the study and the eligibility criteria and to increase participant comfort in answering sensitive questions about their health, potential participants first were asked to answer two questions that assessed past-month alcohol and cigarette use. Potential participants then were asked a series of three questions that determined their study eligibility. First, in order to be eligible for the study, participants had to endorse using e-cigarettes at least weekly on the following question: “During the past month, how often did you use an electronic cigarette? (response options: never, once, 2-3 times, once a week, twice a week, 3-4 times a week, 5-6 times a week, or every day; Morean & Wedel, 2017). Eating disorder status was determined using two questions. First, participants were provided with a list of 20 medical and psychological conditions (e.g., high blood pressure, anxiety disorders, eating disorders) and were asked to check off all conditions that a “doctor, nurse, or other medical professional had ever officially diagnosed [them] as having.” All participants then were asked the following question: “During your lifetime, has a doctor, nurse, or other medical professional ever OFFICIALLY diagnosed you as having an eating disorder? Please select all options that apply to you.” Response options included: “Yes, I have been diagnosed as having Anorexia Nervosa; Yes, I have been diagnosed as having Bulimia Nervosa; Yes, I have been diagnosed as having Binge Eating Disorder; Yes, I have been diagnosed as having an eating

disorder (Other Specified Feeding or Eating Disorder); and No, I have never been diagnosed as having any eating disorder.” Participants who checked off “eating disorder” from the list of medical/psychological conditions and who indicated that they officially had been diagnosed as having an eating disorder on the second question were categorized as having a history of an eating disorder. Individuals who did not select “eating disorder” from the list of medical conditions and who replied that they had never been diagnosed as having an eating disorder were categorized as not having an eating disorder.

**Demographics.** Participants reported on a wide range of demographic characteristics. However, for the purpose of the current study, biological sex, race, and age were included in relevant analyses.

**Current Eating Disorder Status and Primary Diagnosis.** Participants who endorsed having a lifetime history of an eating disorder reported on whether they currently have a diagnosis of Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder or OSFED. They then were asked to report on their primary diagnosis.

**Eating Disorder Examination Questionnaire (EDE-Q 6.0; Fairburn & Beglin, 2008).** All participants answered 28 questions that assess the Diagnostic and Statistical Manual, Edition 5 (DSM-5) criteria for Anorexia Nervosa, Bulimia Nervosa, and Binge Eating Disorder. The EDE-Q comprises four subscales (i.e., restraint, eating concern, shape concern, and weight concern) and also is scored globally. For the current study, both the subscale scores and the global score were examined.

**The Eating Attitudes Test (EAT-26; Garner et al., 1982).** All participants answered 26 questions about symptoms and concerns characteristic of eating disorders. The EAT-26 comprises three subscales: dieting, bulimia/food preoccupation, and oral control. The EAT-26

also is scored globally. For the current study, both the subscale scores and the global score were examined.

**Frequency of E-cigarette Use** (Morean & Wedel, 2017). Participants reported on how many times per day they typically use their e-cigarette (1-4, 5-9, 10-14, 15-19, 20-29, 30+ times per day).

**E-liquid Nicotine Content and Concentration** (Morean, Kong, Cavallo, Camenga & Krishnan-Sarin, 2016). Participants first reported whether they typically use e-liquid that contains nicotine (no/yes). Participants who endorsed using e-liquid containing nicotine then reported on the nicotine concentration that they typically use in their e-cigarettes (0, 3, 6, 12, 18, 24, 30mg or more, or I don't know).

**E-liquid Flavor Preferences** (Kong, Morean, Cavallo, Camenga, Krishnan-Sarin, 2015). Participants reported on which e-liquid flavors they use regularly (i.e., tobacco, menthol, mint, fruit, coffee, vanilla, candy/dessert, and alcohol).

**Vaping Motives.** Participants reported whether they currently vape for the following reasons: to lose weight, because of the availability of appealing flavors, because vaping is easy to conceal/hide from others, because vaping is healthier than smoking, for curiosity, or because of low cost. These items were created for inclusion in the current survey.

**Short Form Vaping Consequences Questionnaire** (SVCQ; Morean & L'Insalata, 2017). This modified version of the Smoking Consequences Questionnaire (Brandon & Baker, 1991) was used to assess outcomes associated with vaping. Participants used a 10-point Likert scale (0 = completely unlikely to 9 = completely likely) to rate the likelihood that 21 consequences will occur when they vape. The SVCQ comprises four subscales: Negative Consequences (e.g., Vaping is hazardous to my health), Positive Reinforcement (e.g., When I

vape the taste is pleasant), Negative Reinforcement (e.g., E-cigarettes help me deal with anxiety or worry), and Appetite/Weight Control (e.g., E-cigarettes keep me from overeating).

**Current Tobacco Cigarette Smoking Status.** Participants reported on their current tobacco cigarette smoking status (i.e., “I have never been a cigarette smoker; I am a former smoker meaning that I used to smoke cigarettes, but I successfully quit; I smoke cigarettes occasionally; and I smoke cigarettes daily”). For the current study, occasional and daily tobacco cigarette smokers were categorized as “current smokers.”

### **Data Analytic Plan.**

**Descriptive Statistics.** Descriptive statistics were examined for all study variables. Means, standard deviations, skewness, and kurtosis were examined for continuous variables. Frequencies were examined for categorical variables.

**Manipulation Check.** To ensure that the eating disorder sample evidenced significantly higher levels of eating pathology than the comparison sample, one-way ANOVAs were conducted to determine whether global scale scores and/or the subscale scores of the EAT-26 and the EDE-Q 6.0 differed significantly by eating disorder status (i.e., never, lifetime, current).

**Flavor Use and Vaping Motives.** Chi-square analyses were run to evaluate whether participants with eating disorders differed from participants without eating disorders in terms of their use of specific e-liquid flavors (e.g., tobacco, menthol, mint, fruit) or vaping motives, respectively. Within the sample of participants with a current eating disorder, additional chi-square analyses were run to evaluate whether the use of specific e-liquid flavors or the endorsement of specific vaping motives differed by primary condition.

**Mean-Level Differences in Vaping Frequency, Nicotine Concentration, and Vaping Consequences.** One ANOVAs were run to evaluate potential mean-level differences in vaping

frequency (times per day), nicotine concentration, and vaping consequences by eating disorder status. Within the sample of participants with a current eating disorder, additional one-way ANOVAs were run to evaluate mean-level differences in vaping frequency, nicotine concentration, and vaping consequences by primary diagnosis.

**Evaluating Relationships between Disorder and Vaping Frequency.** Univariate general linear modeling was employed to evaluate whether vaping frequency was associated with participant demographics (sex, age, race), current smoking status (no/yes), e-liquid nicotine content (no/yes), e-liquid flavor preferences (tobacco, menthol, mint, fruit, candy/dessert, vanilla, spices, coffee, and alcohol), and/or vaping consequences (positive reinforcement, negative reinforcement, and appetite/weight control). Given the large number of variables included in the model, separate analyses were run for participants with a current eating disorder and participants with no history of an eating disorder (rather than running a single model with main effects and all 2-way interactions). A model was not run for participants with a lifetime history of an eating disorder given the small number of participants in the sample ( $n = 28$ ) and the large number of independent variables.

## Results

**Descriptive Statistics.** Frequencies and descriptive statistics for central study variables are presented in Table 1. All continuous variables approximated a normal distribution with the exception of vaping frequency (times per day), which was log-transformed to approximate normality. All non-White racial/ethnic groups comprised a small number of participants, so a dichotomous variable reflecting White vs. Non-White was created for inclusion as a covariate in the GLM.

**Manipulation Check.** There were statistically significant differences in EAT-26 and

EDE-Q 6.0 scores by eating disorder status, all  $p$ -values  $< .001$  (See Table 2). Post Hoc comparisons using Bonferroni corrections indicated that participants with current eating disorders evidenced more eating pathology than participants with no history of an eating disorder and participants with a lifetime history of an eating disorder (See Table 3). Thus, the manipulation check was successful.

**Flavor Use.** Chi-square analyses showed that the use of mint, fruit, candy/dessert, spice, coffee, and alcohol e-liquid flavors differed significantly by eating disorder status (See Table 4). Compared to participants with no history of an eating disorder, those with a current eating disorder were more likely to report regularly using the following e-liquid flavors: mint ( $\chi^2 [2] = 11.58, p < .01$ ), fruit ( $\chi^2 [2] = 14.19, p < .01$ ), candy/dessert ( $\chi^2 [2] = 15.71, p < .001$ ), spices ( $\chi^2 [2] = 12.19, p < .01$ ), coffee ( $\chi^2 [2] = 8.77, p < .05$ ), and alcohol ( $\chi^2 [2] = 25.48, p < .001$ ). Participants with a lifetime history of an eating disorder also were more likely to report vaping spice and alcohol flavored e-liquid than were participants with no history of an eating disorder. Use of tobacco, menthol, and vanilla flavors did not differ significantly by eating disorder status.

Among participants currently diagnosed with an eating disorder, chi-square analyses also indicated that the use of several e-liquid flavors (i.e., mint, coffee, and alcohol) differed based on primary diagnosis (i.e., Anorexia, Bulimia, BED, and OSFED; See Table 5). Participants diagnosed with Bulimia Nervosa were more likely to vape mint-flavored e-liquid than were participants diagnosed with Binge Eating Disorder ( $\chi^2 [3] = 8.61, p < .05$ ). Participants diagnosed with either Anorexia Nervosa or Bulimia Nervosa were more likely to vape coffee-flavored e-liquid than were participants diagnosed with Binge Eating Disorder ( $\chi^2 [3] = 11.36, p < .05$ ). Finally, participants diagnosed with Anorexia Nervosa or OSFED were more likely to use alcohol-flavored e-liquid than were participants diagnosed with Binge Eating Disorder ( $\chi^2 [3] =$

16.24,  $p < .01$ ).

**Self-Reported Vaping Motives.** Chi-square analyses indicated that the following vaping motives differed by eating disorder status: vaping for weight loss, vaping for appealing flavors, and vaping because it can be concealed easily from others (See Table 4). Participants with a current eating disorder diagnosis were more likely to report vaping to lose weight ( $\chi^2 [2] = 47.06$ ,  $p < .001$ ) than were participants with no history of an eating disorder and participants with a lifetime history of an eating disorder. Compared to participants with no history of an eating disorder, participants with a current eating disorder diagnosis also were more likely to report vaping to enjoy appealing flavors ( $\chi^2 [2] = 12.79$ ,  $p < .01$ ) and because it is easy to hide from others ( $\chi^2 [2] = 25.31$ ,  $p < .001$ ). There were no differences in vaping for low cost, for curiosity, or because vaping is healthier than smoking based on eating disorder status. Among participants with a current eating disorder, chi-square analyses indicated that vaping motives did not differ based on primary diagnosis ( $\chi^2 [3] = 0.54$ ,  $p > .05$ ; See Table 5).

**Mean-Level Differences in Vaping Frequency.** A one-way, between subjects ANOVA indicated that there was a significant effect of eating disorder status on vaping frequency ( $F [2,636] = 7.85$ ,  $p < .001$ ,  $\eta^2 = 0.03$ , See Table 6). Post Hoc comparisons using Bonferroni corrections indicated that participants with a current eating disorder ( $M = 0.52$ ,  $SD = 0.21$ ) vaped significantly more often than did participants with no history of an eating disorder ( $M = 0.46$ ,  $SD = 0.18$ ,  $p < .01$ ). Participants with a lifetime history of an eating disorder did not differ significantly from either participants with a current eating disorder or participants with no history of an eating disorder with regard to vaping frequency ( $M = 0.52$ ,  $SD = 0.21$ ). Among participants currently diagnosed with an eating disorder, there were no significant differences in vaping frequency based on primary diagnosis ( $F [3,173] = 0.24$ ,  $p > .05$ ,  $\eta^2 = 0.00$ , See Table 7).

**Mean-Level Differences in Nicotine Concentration.** A one-way, between subjects ANOVA indicated that e-liquid nicotine concentration differed by eating disorder status ( $F [2, 585] = 3.10, p < .05, \eta^2 = 0.01$ ). Participants with a current eating disorder ( $M = 9.44, SD = 7.18$ ) reported using e-liquid containing significantly higher nicotine concentrations than did participants with no history of an eating disorder ( $M = 7.86, SD = 6.88, p < .05$ ). However, participants with a lifetime history of an eating disorder did not differ significantly from either participants with a current eating disorder or participants with no history of an eating disorder with regard to nicotine concentration used ( $M = 8.65, SD = 6.81, p\text{-values} > .05$ ). Among participants currently diagnosed with an eating disorder, there were no significant differences in nicotine concentration used based on primary diagnosis ( $F [3, 164] = 0.54, p > .05, \eta^2 = 0.01$ ).

**Mean-Level Differences in S-VCQ Subscale Scores.** A one-way between subjects ANOVA indicated that there was a significant effect of eating disorder status on the following vaping consequences: Negative Reinforcement ( $F [2, 636] = 11.31, p < .001, \eta^2 = 0.03$ ) and Appetite/Weight Control ( $F [2, 636] = 11.27, p < .001, \eta^2 = 0.03$ , See Table 6). Post Hoc comparisons using Bonferroni corrections indicated that participants with a current eating disorder ( $M = 7.02, SD = 1.97$ ) reported significantly higher negative reinforcement scores than both participants with a lifetime eating disorder ( $M = 5.80, SD = 2.24, p < .05$ ) and participants with no history of an eating disorder ( $M = 6.13, SD = 2.27, p < .001$ ). Similarly, participants with a current eating disorder ( $M = 6.27, SD = 2.69$ ) reported significantly higher Appetite/Weight Control from vaping than did participants with a lifetime eating disorder ( $M = 4.66, SD = 2.54, p < .05$ ) and those with no history of an eating disorder ( $M = 5.21, SD = 2.69, p < .001$ ). There were no significant differences in Negative Consequences scores ( $F [2, 636] = 0.09, p > .05, \eta^2 =$

0.00) or Positive Reinforcement scores ( $F [2, 636] = 0.18, p > .05, \eta^2 = 0.01$ ) based on eating disorder status (See Table 6). Among participants with a current eating disorder, primary diagnosis was not significantly related to vaping consequences (Negative Consequences  $F [3, 173] = 1.10, \eta^2 = 0.02$ ), Positive Reinforcement  $F [3, 173] = 1.05, \eta^2 = 0.02$ ), Negative Reinforcement  $F [3, 173] = 0.95, \eta^2 = 0.02$ ), or Appetite/Weight Control  $F [3, 173] = 2.29, \eta^2 = 0.04$ , all  $p$ -values  $> .05$ , See Table 7).

**Predicting Vaping Frequency.** Among participants with no history of eating disorders, the model accounted for 9.4% of the variance in vaping frequency. Using nicotine e-liquid ( $\eta_p^2 = .02, p < .01$ ), menthol-flavored e-liquid flavor ( $\eta_p^2 = .02, p < .01$ ), candy/dessert-flavored e-liquid flavor ( $\eta_p^2 = .01, p < .05$ ), and experiencing negative reinforcement from vaping ( $\eta_p^2 = .01, p < .01$ ) were associated with more frequent vaping. Among participants with a current eating disorder, the model accounted for 24.8% of the variance in vaping frequency. Using nicotine e-liquid ( $\eta_p^2 = .03, p < .05$ ), mint-flavored e-liquid ( $\eta_p^2 = .02, p < .05$ ), vanilla-flavored e-liquid ( $\eta_p^2 = .03, p < .05$ ) as well as experiencing positive reinforcement ( $\eta_p^2 = .10, p < .001$ ) and appetite/weight control ( $\eta_p^2 = .04, p < .01$ ) from vaping were associated with more frequent vaping (See Table 8).

## Discussion

The current study provides the first scientific evidence that individuals with eating disorders are vaping to lose weight. Importantly, individuals currently diagnosed with an eating disorder reported vaping to lose weight at three times the rate of individuals with no history of an eating disorder (i.e., 32.0% versus 10.4%). Of note, vaping to lose weight did not differ significantly by disorder, indicating that having any eating disorder confers risk for vaping. In addition to vaping for weight loss, individuals with a current eating disorder diagnosis were

vaping more frequently than individuals with no history of an eating disorder and were using significantly higher concentrations of nicotine. Of note, the majority of individuals with eating disorders were current cigarette smokers and 43.8% of them reported using higher concentrations of nicotine in their e-liquid than what is typically found in tobacco cigarettes (~10 mg, Kozlowski et al., 1998), increasing their overall nicotine exposure. These findings are particularly concerning because nicotine is associated with deleterious effects on the heart (Benowitz & Gourlay, 1997), and individuals with eating disorders most often die as the result of heart failure (Hill et al., 2012).

Consistent with prior research indicating that individuals with eating disorders often have a preoccupation with secrecy (Kazlouski et al., 2011), individuals currently diagnosed with an eating disorder endorsed vaping because it is easier to conceal/hide from others at higher rates than individuals with no history of an eating disorder. This information is valuable for treatment providers who may not realize that their clients are using e-cigarettes because they lack the typical cues associated with traditional tobacco cigarette use (e.g., the characteristic smell of tobacco smoke). As expected, individuals with eating disorders also were more likely to be motivated to vape by the availability of food and beverage-inspired flavors (e.g., candy, coffee) than were individuals with no history of eating disorders. When examining specific flavors, individuals with current eating disorders were more likely to use the following flavors: mint, fruit, candy/dessert, spices, coffee, and alcohol. Interestingly, no differences in the use of traditional flavors associated with tobacco use (i.e., tobacco and menthol) based on eating disorder status were observed. Similarly, there were no differences in perceptions that e-cigarettes are healthier than cigarettes. These findings likely are due to the fact that each sample comprised a large percentage of current cigarette smokers (never eating disorder [73.9%],

lifetime eating disorder [71.4%], current eating disorder [71.3%]). Further, there was evidence that individuals with eating disorders that are restrictive in nature (i.e., Anorexia Nervosa, Bulimia Nervosa) may be more likely to use flavors that are not closely related to restricted foods (e.g., mint, coffee) at higher rates than individuals with other eating disorders. These preliminary findings align with the notion that individuals who consistently attend to calorie and fat content and who consequently restrict their intake of foods and beverages on these bases may be afraid that indulging in the use of e-liquid flavors that mimic such forbidden foods may lead to a loss of control and consumption of the actual product. However, future research that incorporates larger sample sizes is needed to more fully investigate potential differences in flavor preferences by eating disorder diagnosis.

Finally, the current study provided novel information about how nicotine content, flavor preferences, and vaping consequences differentially relate to vaping frequency for individuals who currently have an eating disorder versus those with no history of an eating disorder. Among individuals with no history of an eating disorder, vaping frequency was associated with factors that accompany traditional tobacco cigarette use like nicotine content, menthol flavor, and the experience of negative reinforcement (i.e., reductions in negative affect). However, among individuals who currently had an eating disorder diagnosis, vaping frequency was associated with e-liquid nicotine content, using mint or vanilla flavored e-liquid flavors, and experiencing positive reinforcement and appetite/weight control as the result of vaping. In sum, it appears that vaping frequency was driven largely by factors that traditionally are associated with tobacco cigarette use among individuals with no eating disorder history (Tomkins, 1966). In contrast, vaping frequency appears to be driven by the appeal of nicotine, weight loss, and the experience of positive reinforcement from the use of flavors among individuals who currently have an ED.

The study findings should be interpreted in light of several limitations. First the quality of self-report data is limited by the participants' ability and willingness to respond honestly and accurately, although the anonymity of the online survey should have helped to alleviate this concern. In addition, the manipulation check indicated that the eating disorder and non-ED samples differed significantly from one another with regard to their scores on diagnostic eating disorder scales. Of note, the generalizability of the study results may be limited by the fact that all participants were adults who were registered market research panel members recruited through Qualtrics. Therefore, it is unclear the extent to which the observed pattern of results would be replicated in other samples (e.g., adolescents, individuals obtaining treatment for eating disorders in a clinical setting). However, the fact that the sex breakdown of individuals diagnosed with eating disorders (75% female, 25% male) mirrors rates regularly cited in the literature helps to instill confidence in the results (Hudson et al., 2007). Lastly, the small number of individuals who had an eating disorder in the past but who no longer carry the diagnosis limited the conclusions that could be drawn about this group and resulted in this group being left out of the GLM analyses. The fact that these individuals shared qualities both with the group of individuals with no history of an eating disorder and with the group of individuals who currently had an eating disorder indicates that they may represent a true intermediary sample. Given that recovery from eating disorders is lengthy (57-79 months) and often is characterized by relapse (Strober et al., 1997), understanding how e-cigarettes are used within this subpopulation may be important in preventing the use of vaping as a compensatory behavior or a trigger for engaging in disordered eating behavior. Thus, future research that includes a larger sample size of individuals who have an eating disorder in remission is needed to better understand how eating disorder history relates to e-cigarette use.

In spite of the limitations, the current study indicates that individuals who currently have an eating disorder are vaping frequently and are doing so to lose weight, because it is easy to hide from others, and for positive reinforcement obtained via the use of flavors. The current findings are relevant to eating disorder treatment providers who may be unaware that their clients are using vaping as a novel, inconspicuous weight loss tool. Conceptualizing vaping as a compensatory behavior may be an important part of eating disorder treatment in the future. The current findings also could be used to inform the FDA's efforts to regulate e-cigarettes and e-cigarette advertisements. While e-cigarettes never have been approved for smoking cessation purposes, they initially were introduced and marketed as smoking cessation devices. Advertisements continue to market e-cigarettes as healthier alternatives to cigarettes, but research, including the current study, provides evidence that people are using e-cigarettes for additional unforeseen reasons including weight loss. Given that e-cigarettes are not approved weight loss devices, the FDA should consider regulating e-cigarette advertisements that promote using e-cigarettes for weight loss.

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Table 1. Descriptive statistics within the full sample and by eating disorder status

	Full Sample (N = 639)		Never ED (n = 433)		Lifetime ED (n = 28)		Current ED (n = 177)	
	% / Mean	Std. Dev.	% / Mean	Std. Dev.	% / Mean	Std. Dev.	% / Mean	Std. Dev.
<b>Age</b>	37.23	11.17	38.98	11.71	35.29	11.86	33.26	8.35
<b>Sex</b> (% female)	61.3%		54.7%		92.9%		72.5%	
<b>Race</b> (% White)	83.3%		83.4%		78.6%		83.7%	
<b>Smoking Status</b> (% yes)	73.1%		73.9%		71.4%		71.3%	
<b>Eating Disorder Status</b>								
<i>Never</i>	67.8%		100.0%		0.0%		0.0%	
<i>Lifetime</i>	4.4%		0.0%		100.0%		100.0%	
<i>Current</i>	27.9%		0.0%		0.0%		100.0%	
<b>Primary Diagnosis</b>								
<i>Anorexia Nervosa</i>	–		–		–		27.1%	
<i>Bulimia Nervosa</i>	–		–		–		22.0%	
<i>Binge Eating Disorder</i>	–		–		–		39.0%	
<i>OSFED</i>	–		–		–		11.9%	
<b>EAT 26</b> (Global Score)	2.66	1.01	2.37	0.96	2.70	0.53	3.35	0.82
<b>EDE-Q 6.0</b> (Global Score)	2.62	1.60	2.03	1.35	3.19	1.31	3.94	1.38
<b>E-Liquid Flavors</b>								
<i>Tobacco</i>	34.9%		36.7%		35.7%		30.3%	
<i>Menthol</i>	37.6%		39.0%		42.9%		33.1%	
<i>Mint</i>	23.9%		20.6%		17.9%		33.1%	
<i>Fruit</i>	40.4%		35.3%		50.0%		51.1%	
<i>Candy/Dessert</i>	27.4%		22.6%		32.1%		38.2%	
<i>Vanilla</i>	15.2%		14.3%		7.1%		18.5%	
<i>Spice</i>	9.5%		6.9%		21.4%		14.0%	
<i>Coffee</i>	19.2%		16.9%		10.7%		26.4%	
<i>Alcohol</i>	12.5%		8.1%		28.6%		20.8%	
<b>Vaping Motives</b>								
<i>Weight Loss</i>	16.1%		10.4%		3.6%		32.0%	
<i>Appealing Flavors</i>	47.1%		42.3%		60.7%		56.7%	
<i>Hide from Others</i>	21.3%		15.9%		21.4%		34.3%	
<i>Healthier than Smoking</i>	45.4%		43.6%		39.3%		50.60%	
<i>Low Cost</i>	32.4%		31.2%		39.3%		34.3%	
<i>Curiosity</i>	16.4%		15.9%		7.1%		19.1%	
<b>Vaping Frequency</b>								
<i>0 times/day</i>	0.6%		0.7%		0.0%		0.6%	
<i>1-4 times/day</i>	42.4%		45.0%		35.7%		37.1%	
<i>5-9 times/day</i>	23.6%		26.1%		21.4%		18.0%	
<i>10-14 times/day</i>	13.0%		12.2%		14.3%		14.6%	
<i>15-19 times/day</i>	7.4%		6.2%		7.1%		10.1%	
<i>20-29 times/day</i>	3.9%		3.7%		3.6%		4.5%	
<i>30+ times/day</i>	9.1%		6.0%		17.9%		15.2%	
<b>Nicotine E-liquid</b> (% yes)	87.0%		86.0%		92.6%		92.0%	
<b>Nicotine Concentration</b>	8.35	6.99	7.86	6.88	8.65	6.81	9.44	7.18
<b>Vaping Consequences</b>								
<i>Negative Consequences</i>	5.55	2.39	5.53	2.44	5.54	2.03	5.62	2.32
<i>Positive Reinforcement</i>	7.42	1.91	7.33	1.93	7.71	1.26	7.61	1.95
<i>Negative Reinforcement</i>	6.37	2.22	6.13	2.27	5.80	2.24	7.02	1.97
<i>Appetite/Weight Control</i>	5.48	2.73	5.21	2.69	4.66	2.54	6.27	2.69

Table 2. ANOVA results showing mean-level differences in eating disorder indices by eating disorder status

EAT-26		Never ED	Lifetime ED	Current ED	<i>F</i>	$\eta^2$
		Mean (SD)	Mean (SD)	Mean (SD)		
	<i>Dieting</i>	2.54 (0.99) a	3.04 (0.68) b	3.57 (0.86) c	76.20	0.19***
	<i>Bulimia &amp; Food Preoccupation</i>	2.17 (1.09) a	2.33 (0.68) a	3.39 (0.98) b	86.73	0.21***
	<i>Oral Control</i>	2.41 (0.98) a	2.74 (0.91) a,b	3.09 (1.01) b	30.37	0.09***
	<i>Global</i>	2.37 (0.96) a	2.70 (0.53) a	3.35 (0.82) b	73.48	0.19***
<b>EDE-Q 6.0</b>						
	<i>Restraint</i>	1.29 (1.40) a	2.33 (1.73) b	2.86 (1.81) b	67.86	0.18***
	<i>Eating Concern</i>	1.38 (1.27) a	1.96 (1.50) a	3.40 (1.58) b	135.87	0.30***
	<i>Shape Concern</i>	2.74 (1.72) a	4.44 (1.47) b	4.73 (1.45) b	99.07	0.24***
	<i>Weight Concern</i>	2.73 (1.67) a	4.03 (1.41) b	4.76 (1.42) b	105.86	0.25***
	<i>Global</i>	2.03 (1.35) a	3.19 (1.31) b	3.94 (1.38) c	126.06	0.28***

Note. Never Eating Disorder Sample (n = 433); Lifetime Eating Disorder Sample (n = 28); Current Eating Disorder Sample (n = 177); degrees of freedom for all models = 2, 636. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ . \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Table 3. ANOVA results showing mean-level differences in eating disorder indices by current eating disorder diagnosis

EAT-26		Anorexia	Bulimia	BED	OSFED	<i>F</i>	$\eta^2$
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
	<i>Dieting</i>	3.68 (0.93) a	3.79 (0.77) a	3.44 (0.76) a	3.35 (1.03) a	2.22	0.04
	<i>Bulimia &amp; Food Preoccupation</i>	3.35 (1.00) a, b, c	3.73 (0.92) a, b	3.42 (0.85) b	2.70 (1.13) c	5.49	0.09**
	<i>Oral Control</i>	3.48 (0.92) a	3.24 (0.94) a, b	2.77 (1.06) b	2.90 (0.85) a, b	5.59	0.09**
	<i>Global</i>	3.51 (0.85) a, b	3.59 (0.74) a	3.21 (0.78) a, b	2.98 (0.82) b	3.96	0.06**
<b>EDE-Q 6.0</b>							
	<i>Restraint</i>	3.22 (1.95) a	3.35 (1.91) a	2.46 (1.57) b	2.48 (1.78) a	3.12	0.05*
	<i>Eating Concern</i>	3.45 (1.63) a, b	3.82 (1.51) a	3.40 (1.52) a, b	2.50 (1.62) b	3.28	0.05*
	<i>Shape Concern</i>	4.61 (1.50) a	4.91 (1.47) a	4.80 (1.37) a	4.45 (1.61) a	0.61	0.01
	<i>Weight Concern</i>	4.66 (1.50) a	4.96 (1.43) a	4.87 (1.27) a	4.26 (1.64) a	1.36	0.02
	<i>Global</i>	3.99 (1.50) a	4.26 (1.45) a	3.88 (1.18) a	3.42 (1.52) a	1.76	0.03

Note. Anorexia Nervosa Sample (n = 48); Bulimia Nervosa Sample (n = 39); Binge Eating Disorder Sample (n = 69); OSFED Sample (n = 21); degrees of freedom for all models = 3, 173. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ .

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Table 4. Chi-square analyses showing differences in endorsement of flavor preferences and vaping motives by eating disorder status

<b>Flavors</b>	<b>Never ED</b>	<b>Lifetime ED</b>	<b>Current ED</b>	$\chi^2$
<i>Tobacco</i>	36.7% a	35.7% a	30.3% a	2.27
<i>Menthol</i>	39.0% a	42.9% a	33.1% a	2.21
<i>Mint</i>	20.6% a	17.9% a, b	33.1% b	11.58**
<i>Fruit</i>	35.3% a	50.0% a, b	51.1% b	14.19**
<i>Candy/Dessert</i>	22.6% a	32.1% a, b	38.2% b	15.71***
<i>Vanilla</i>	14.3% a	7.1% a	18.5% a	3.21
<i>Spices</i>	6.9% a	21.4% b	14.0% b	12.19**
<i>Coffee</i>	16.9% a	10.7% a, b	26.4% b	8.77*
<i>Alcohol</i>	8.1% a	28.6% b	20.8% b	25.48***
<b>Motives</b>				
<i>Weight Loss</i>	10.4% a	3.6% a	32.0% b	47.06***
<i>Appealing Flavors</i>	42.3% a	60.7% a, b	56.7% b	12.79**
<i>Hide from Others</i>	15.9% a	21.4% a, b	34.3% b	25.31***
<i>Healthier than Smoking</i>	43.6% a	39.3% a	50.6% a	2.87
<i>Low Cost</i>	31.2% a	39.3% a	34.3% a	1.19
<i>Curiosity</i>	15.9% a	7.1% a	19.1% a	2.76

Note. Never Eating Disorder Sample (n = 433); Lifetime Eating Disorder Sample (n = 28); Current Eating Disorder Sample (n = 177); degrees of freedom for all models = 2. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ .

\*  $p < .05$     \*\*  $p < .01$     \*\*\*  $p < .001$

Table 5. Chi-square analyses showing differences in endorsement of flavor preferences and vaping motives by current eating disorder diagnosis

<b>Flavors</b>	<b>Anorexia</b>	<b>Bulimia</b>	<b>BED</b>	<b>OSFED</b>	$\chi^2$
<i>Tobacco</i>	33.3% a	17.9% a	34.8% a	33.3% a	3.76
<i>Menthol</i>	33.3% a	43.6% a	29.0% a	28.6% a	2.65
<i>Mint</i>	39.6% a, b	46.2% b	21.7% a	28.6% a, b	8.61*
<i>Fruit</i>	54.2% a	51.3% a	49.3% a	47.6% a	0.37
<i>Candy/Dessert</i>	39.6% a	35.9% a	37.7% a	38.1% a	0.13
<i>Vanilla</i>	16.7% a	17.9% a	21.7% a	9.5% a	1.72
<i>Spices</i>	22.9% a	12.8% a	10.1% a	9.5% a	4.38
<i>Coffee</i>	37.5% a	35.9% a	13.0% b	23.8% a, b	11.36*
<i>Alcohol</i>	35.4% a	12.8% a, b	10.1% b	38.1% a	16.24**
<b>Motives</b>					
<i>Weight Loss</i>	41.7% a	30.8% a	24.6% a	33.3% a	3.84
<i>Appealing Flavors</i>	56.3% a	64.1% a	49.3% a	66.7% a	3.27
<i>Hide from Others</i>	29.5% a	21.3% a	36.1% a	13.1% a	0.54
<i>Healthier than Smoking</i>	58.3% a	48.7% a	47.8% a	47.6% a	0.69
<i>Low Cost</i>	41.7% a	28.2% a	33.3% a	33.3% a	1.83
<i>Curiosity</i>	20.8% a	12.8% a	21.7% a	19.0% a	1.39

Note. Anorexia Nervosa Sample (n = 48); Bulimia Nervosa Sample (n = 39); Binge Eating Disorder Sample (n = 69); Other Specified Feeding or Eating Disorder [OSFED] Sample (n = 21); df = 3. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ .

\* $p < .05$     \*\* $p < .01$     \*\*\* $p < .001$

Table 6. ANOVA results showing mean-level differences in vaping frequency and vaping consequences by eating disorder status

<b>Frequency</b>	<b>Never ED</b>	<b>Lifetime ED</b>	<b>Current ED</b>	<b>F</b>	<b><math>\eta^2</math></b>
	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>		
<i>Vaping Times per Day</i>	0.46 (0.18) a	0.52 (0.21) a,b	0.52 (0.21) b	7.85	0.03***
<b>SVCQ</b>					
<i>Negative Consequences</i>	5.23 (2.44) a	5.54 (2.03) a	5.62 (2.32) a	0.09	0.00
<i>Positive Reinforcement</i>	7.73 (1.93) a	7.71 (1.26) a	7.61 (1.96) a	0.18	0.01
<i>Negative Reinforcement</i>	6.13 (2.27) a	5.80 (2.24) a	7.02 (1.97) b	11.31	0.03***
<i>Appetite/Weight Control</i>	5.21 (2.69) a	4.66 (2.54) a	6.27 (2.69) b	11.27	0.03***

Note. Never Eating Disorder Sample (n = 433); Lifetime Eating Disorder Sample (n = 28); Current Eating Disorder Sample (n = 177); degrees of freedom for all models = 2, 636. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ . \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Table 7. ANOVA results showing mean-level differences in vaping frequency and vaping consequences by current eating disorder diagnosis

<b>Frequency</b>	<b>Anorexia</b>	<b>Bulimia</b>	<b>BED</b>	<b>OSFED</b>	<b>F</b>	<b><math>\eta^2</math></b>
	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>		
<i>Vaping Times per Day</i>	0.52 (0.21) a	0.54 (0.19) a	0.51 (0.22) a	0.50 (0.21) a	0.24	0.00
<b>SVCQ</b>						
<i>Negative Consequences</i>	5.28 (2.12) a	6.16 (2.22) a	5.55 (2.41) a	5.48 (2.60) a	1.10	0.02
<i>Positive Reinforcement</i>	7.68 (2.16) a	7.35 (1.95) a	7.50 (1.89) a	8.24 (1.56) a	1.05	0.02
<i>Negative Reinforcement</i>	7.39 (1.71) a	6.98 (1.87) a	6.76 (2.08) a	7.01 (2.34) a	0.95	0.02
<i>Appetite/Weight Control</i>	6.81 (2.52) a	6.76 (2.57) a	5.70 (2.66) a	5.92 (3.14) a	2.29	0.04

Note. Anorexia Nervosa Sample (n = 48); Bulimia Nervosa Sample (n = 39); Binge Eating Disorder Sample (n = 69); OSFED Sample (n = 21); degrees of freedom for all models = 3, 173. Within rows, letters reflect the results of Bonferroni-corrected comparisons among the eating disorder status groups. Cell values with different letters assigned to them differ significantly from one another at  $p < .05$ . \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Table 8. GLM evaluating predictors of vaping frequency by eating disorder status

Independent Variable	Vaping Frequency (Times Per Day)			
	Never ED		Current ED	
	F	$\eta_p^2$	F	$\eta_p^2$
<b>Sex</b>	0.01	0.00	0.62	0.00
<b>Age</b>	0.04	0.00	1.51	0.01
<b>Race (Non-White, White)</b>	0.01	0.00	0.10	0.00
<b>Current Smoking Status</b>	0.38	0.00	3.38	0.02
<b>E-liquid Nicotine Content</b>	8.77	0.02**	5.47	0.03*
<b><u>E-liquid Flavors</u></b>				
<i>Tobacco</i>	0.92	0.00	0.96	0.01
<i>Menthol</i>	6.67	0.02**	0.02	0.00
<i>Mint</i>	0.13	0.00	3.57	0.02*
<i>Fruit</i>	0.01	0.00	1.14	0.01
<i>Candy/Dessert</i>	6.28	0.01*	0.10	0.00
<i>Vanilla</i>	2.02	0.01	4.77	0.03*
<i>Spices</i>	1.07	0.00	0.02	0.00
<i>Coffee</i>	1.07	0.00	0.02	0.00
<i>Alcohol</i>	0.72	0.00	0.11	0.00
<b><u>Vaping Consequences</u></b>				
<i>Positive Reinforcement</i>	3.17	0.01	17.88	0.10***
<i>Negative Reinforcement</i>	8.88	0.01*	3.31	0.02
<i>Appetite &amp; Weight Control</i>	3.49	0.01	6.86	0.04**

Note. Adjusted  $R^2$  (Never ED) = 0.09,  $df$  (17, 412); Adjusted  $R^2$  (Current ED) = 0.25,  $df$  (17, 157); \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$