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## CHARACTERISTICS, USE PATTERNS AND PERCEPTIONS OF ELECTRONIC CIGARETTE USERS WHO WERE NEVER TRADITIONAL CIGARETTE SMOKERS

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### 1. INTRODUCTION

Since their introduction in the United States in 2007, electronic cigarettes (e-cigs) have risen in popularity. A nationally representative sample of adults showed that between 2010 and 2013, ever use of e-cigs increased from 1.8% to 13% (McMillen, Gottlieb, Shaefer, Winickoff, & Klein, 2015). While use is significantly higher in those who are current or former smokers (Delnevo et al., 2015), there is concern that e-cigs may appeal to never cigarette smokers and cause them to become nicotine dependent (Cobb, Hendricks, & Eissenberg, 2015). Based on 2014 data from the U.S. National Health Interview Survey, 2.8% of never cigarette smoking adults had tried e-cigs, and 0.4% were currently using them some days or every day (Delnevo et al., 2015). Although many cigarette smokers report using e-cigs as a smoking cessation or reduction tool (Foulds, Veldheer, & Berg, 2011), it is unclear why never cigarette smokers are using e-cigs.

Never cigarette smoking e-cig users are important to understand as they have the potential to develop nicotine addiction through a new mode of delivery that has similarities to a cigarette (McMillen et al., 2015). While it is certainly possible that never tobacco users are initiating nicotine use with e-cigs, the majority of the literature focuses primarily on youth populations. Some studies have found evidence of e-cig uptake among never cigarette smoking adolescents, although rates of e-cig use are still higher in adolescent cigarette smokers (Bunnell et al., 2015; Camenga et al., 2014). They have also found there may be differences in risk factors for tobacco product use among adolescents using e-cigs vs.

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combustible cigarettes and those at intermediate levels of risk may engage in e-cig use when they would not have otherwise been susceptible to tobacco product use (Wills, Knight, Williams, Pagano, & Sargent, 2015). While these studies assume that adolescents are initiating nicotine use with e-cigs, a recent study has shown that a significant proportion of adolescent e-cig users are using e-cigs that do not contain nicotine (Miech, Patrick, O'Malley, & Johnston, 2016). Adults may differ from adolescents in their reasons for use and use patterns but there have been few studies that have examined e-cig use among adult never cigarette smokers.

A comprehensive survey study conducted by Farsalinos et al. included an analysis of the use patterns of e-cig users who were never cigarette smokers, but it did not account for traditional tobacco product use aside from cigarettes (e.g. cigars, hookah, pipes, and chew) (Farsalinos, Romagna, Tsiapras, Kyrzopoulos, & Voudris, 2014). If the never cigarette smokers are current or past traditional tobacco product users taking up e-cigs as an alternative to traditional tobacco, it is not the case that they have initiated their nicotine addiction with e-cigs. For instance, Berg conducted a quantitative survey of young adult e-cig users including a full tobacco use history and found that more than 75% of never cigarette smokers had used at least one other tobacco product in their lifetime. Berg noted the need for qualitative research to more fully understand the reasoning behind e-cig use in this population (Berg, 2016).

Because quantitative methods are most commonly used when studying e-cigs, it is useful to present quantitative data for comparability across studies. However, qualitative research is also useful when a phenomenon is not well understood because these methodologies allow for the illumination of contextual factors and details from the participant that would not otherwise be captured when using quantitative methods alone. Due to the limited data available on e-cig users who were never cigarette smokers, combining these methodologies using a mixed methods approach allows for strengthening of the quantitative results through the support of qualitative responses. Therefore, this study aims to utilize a mixed methods approach in order to gain a more comprehensive understanding of adult e-cig users who were never cigarette smokers with regard to their traditional tobacco product use, reasons for e-cig use and e-cig use patterns as well as to identify topics for future research within this population.

## 2. MATERIALS AND METHODS

This is a convergent mixed methods survey study design (Creswell, 2014). Since little is known about e-cig users who were never cigarette smokers, a mixed methods approach was chosen which assumes that multiple types of data provide a more complete understanding of the research question (Creswell, 2014). Using this method, we are able to further illuminate the main quantitative findings of the study by integrating them with the qualitative views and perspectives of the participants expressed in open-ended text responses.

### 2.1 Survey methods and questions

E-cig users 18 years of age were invited to complete a voluntary and anonymous 158-item online survey regarding their use and perceptions of e-cigs. A convenience sample was

recruited by posting the survey on a variety of websites such as WebMD and E-Cigarette Forum and those who visited these sites were able to share the survey link with others who may be interested. Data reported here were collected between December 2012 and August 2014 and managed using REDCap electronic data capture tools hosted at the Penn State Milton S. Hershey Medical Center and College of Medicine. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies (Harris et al., 2009). Data collected included demographics, tobacco product use (including cigars, hookah, pipes, and chew), details of e-cig use, and e-cig preferences including whether the participant was using a first generation device (FGD) or advanced generation device (AGD), defined as those larger than a cigarette or with a manual button to press prior to inhalation (Yingst et al., 2015). Additional e-cig preferences included “which of the following e-cig characteristics are important to you: variety of liquid flavors, shaped like a cigarette, fast battery charge, long battery life, provides good vapor quality” with answer choices of “not important”, “a little important”, and “very important”. Embedded in the quantitative survey were three qualitative questions: “please describe any other e-cig characteristics that are important to you”, “please describe any other effects that you have experienced as a result of using e-cigs”, and “please provide any additional information you believe a public health researcher should know, in order to understand the electronic cigarette”. Participants could type as much or as little as they wanted in response to these questions. Further details of the survey and methods have been reported elsewhere (Foulds et al., 2015).

## 2.2 Participant selection and classification

Of 6,194 complete survey responses identified in the initial dataset, eleven were excluded for missing data on smoking status. Smoking status was classified based on the question “have you ever been a traditional cigarette smoker?” to which ever cigarette smokers (ECS) responded “yes, in the past”, “yes, current occasional user”, or “yes, current daily user” and never cigarette smokers (NCS) responded “no, never”. 6,047 participants (98.2%) were classified as ECS while 136 participants (1.8%) were classified as NCS. Of NCS, an additional twenty four participants were excluded for providing conflicting information regarding tobacco use elsewhere in the survey. Two NCS records were excluded because they were found to be duplicates based on identical responses to gender, location, race, education and employment information as well as similar qualitative responses. As we were interested in the full tobacco use history of NCS, they were further categorized into two groups for analysis: those who had ever been traditional tobacco users (TTU) and those who were never tobacco users (NTU). Traditional tobacco product use was classified based on responses to the questions “have you ever been a cigar smoker?”, “have you ever been a pipe smoker?”, “have you ever been a hookah user?”, and “have you ever used smokeless/chewing tobacco?” NTU responded “no” to all of these questions.

## 2.3 Statistical Analysis

**2.3.1 Quantitative Data**—The quantitative data was analyzed using SAS software version 9.4 (Cary, NC). Means and frequencies were used to illustrate demographic and e-cig use characteristics of the sample. Chi square tests and two tailed t-tests were used to determine differences between ECS and NCS as well as NTU and TTU for characteristics of interest.

When appropriate, non-parametric Wilcoxon-Mann-Whitney tests were performed. P-values of  $< 0.05$  were considered statistically significant.

**2.3.2 Qualitative data**—For NCS who responded to the qualitative questions, responses were analyzed for themes using the constant comparative method (Glaser, 1967). Initially, one researcher (EH) read through complete survey responses and compared them against one another to identify themes in the data. Once an initial coding theme was developed, all researchers met to discuss the emerging themes, clarify any questions that arose and to develop a final coding scheme. Next, the data was coded using QSR International's NVIVO 10 software (Burlington, MA). Where there was uncertainty during the final coding process regarding how to code a particular response, the research team met (EH, SV, JY, SH) to review the queries. Discussion continued until consensus was met. When necessary to gain a fuller understanding, responses were triangulated using the participant's quantitative data (Merriam, 2009).

### 3. RESULTS

6,157 e-cig users, including 6,047 ever cigarette smokers (ECS) and 110 never cigarette smokers (NCS) were included in this analysis. The sample was largely white (91%), male (68%), and had an average age of 40 years (range 18–83). Participants had used their e-cig an average of 24 days out of the past 28 with a median twelve uses per day and thirty minutes to first use of the day after waking. 69% of the sample was using an advanced generation device, and the mean e-liquid nicotine concentration used was 16.4 mg/mL ( $n=5901$ ). 127 (2%) participants were using zero nicotine concentration e-liquid. The sample had an average Penn State E-cig Dependence Index score of 7.8, indicating relatively low levels of dependence on their e-cigs (Foulds et al., 2015).

Demographics and e-cig use characteristics for both ECS and NCS can be found in Table 1. Compared to ECS, NCS were younger, less likely to be white, and more likely to have a college education. NCS exhibited lower dependence on their e-cigs, had a longer time to first use, used their e-cigs fewer times per day (one "time" defined as 15 puffs or about ten minutes) (Foulds et al., 2015) and had been using for a shorter period of time than ECS. NCS were also less likely to be using an advanced generation device and more likely to be using zero nicotine concentration e-liquid. NCS were more likely to view being shaped like a cigarette as an important e-cig characteristic.

Within the sample of 110 NCS, sixty-nine participants (63%) were traditional tobacco users (TTU) and forty-one participants (37%) were never tobacco users (NTU). Among TTU, the most commonly used tobacco product was cigars (42%), followed by hookah (38%), pipes (25%), and chew (15%). 58% of TTU had used more than one traditional tobacco product. The median time since last traditional tobacco product use was thirty days (range 0–720). The only significant differences in demographics between NTU and TTU were gender and education. TTU were more likely to be male and less likely to have a college education. The only difference in e-cig use characteristics between NTU and TTU was time to first use, in which TTU had a significantly longer time to first use than NTU (TTU median 120 minutes vs. NTU median 60 minutes,  $p$ -value .001). Primary reasons for e-cig use among NCS can

be found in Table 2. The most commonly reported primary reason for use in both NTU and TTU was the belief that e-cig use was less harmful to themselves or others than smoking or they preferred the taste of e-cigs.

### 3.1 Qualitative Analysis

67 NCS responded to at least one of the qualitative questions. An overview of themes identified in the qualitative data is presented in Table 3.

**3.1.1 Never Traditional Tobacco Product Users (NTU)**—Among NTU, the most common theme identified was related to health and safety surrounding e-cigs. This included responses about using an e-cig because it was perceived as a way to use nicotine without the harmful effects of smoking. Statements included, *“Consider also the people like me who wish to use tobacco, but do not because of health concerns. For me and others like me, e-cigs are a way to enjoy the feeling of nicotine in a healthy, affordable way”* (Male, 19, AGD, 18mg/mL) and *“I wanted to try tobacco once during my lifetime without the effects of actual smoke, e-cigs have provided that opportunity”* (Male, 60, FGD, 45 mg/ml? 4.5%). Another participant states *“I think it’s very safe especially using products with 0 nicotine”* (Female, 23, AGD, 0 mg/mL). One participant indicated viewing e-cigs as a safer way to fit in with the smoking culture in his family: *“Everyone in my family either is/was a smoker. I never took up smoking and the actual use of cigarettes is very disgusting to me. I can’t use a regular cigarette. I looked for an alternative because I needed something to help relax me when needed. After much research I got into the world of e-cigarettes and it has helped me make other members of family and friends live better”* (Male, 31, AGD, 26 or 36 mg/mL). Another participant expressed her feelings that e-cigs are a safer alternative to traditional tobacco that may prevent her from initiating traditional cigarette use, *“previously a non-smoker, I always felt very tempted by smoking, and worried that I would start. When the smokers around me started switching to e-cigs, I tried it, and liked it. It’s mostly the taste and the hand-mouth behavior that I find enjoyable”* (Female, 33, FGD, 11 mg/mL).

Less prominent, but intriguing topics from NTU responses that may warrant future research included the idea of using the e-cig as a dietary aid or for personal expression through e-cig design choices. The dietary aid topic included responses such as, *“I began using the e-cig as a dietary aid to fight off food cravings”* (Female, 22, AGD, 18 mg/mL) and *“I have never used a tobacco product but use the e-cigarette as a way to engage my hands during the workday instead of seeking out sugary foods/drinks”* (Male, 27, FGD, 0 mg/mL). Responses about e-cig design included statements like, *“I prefer using an e-cigarette that really sticks out in a crowd. Hence the reason why I use the lime green Halo Triton”* (Male, 18, AGD, 12mg/mL) or *“I like a simple and well balanced design that is reminiscent of a cigarette but couldn’t be mistaken for one”* (Female, 33, FGD, 11 mg/mL).

**3.1.2 Traditional Tobacco Product Users (TTU)**—The most common theme identified in the qualitative data for TTU was using e-cigs as an alternative to other tobacco product use, whether to cut down on or replace traditional tobacco product use. Responses included *“I began use of the e-cig when I wanted to quit chewing, and within a month, I quit feeling cravings for tobacco products”* (Male, 20, AGD, 18mg/mL) and *“going from smoking a pipe*

*and using chewing tobacco, I use the e-cig as a safe(r) alternative while still getting a hit of nicotine, which I crave”*(Male, 30, FGD, 48 mg/mL). One participant noted that the e-cig replaced the behavioral aspects of traditional tobacco use by stating *“the importance to me is the ritual of smoking. As a cigar smoker for me, it was easy to get to 0% nicotine but I need to have the feeling that I’m still smoking”*(Male, 44, AGD, 0 mg/mL). Another expressed his view of using an e-cig as an alternative to traditional tobacco use by saying, *“In my case, being a mild cigar and pipe smoker, I would like to use an e-cig instead of choosing to enjoy an afternoon with a cigar or pipe”*(Male, 18, AGD, 12 mg/mL). One participant detailed how he used his e-cig to reduce not only cigar use but nicotine intake altogether by explaining, *“I have weaned myself nearly entirely of nicotine in a bit over two weeks, reducing myself to a 0 mg smoke 90% of the time. I smoke a low nicotine solution only if hit by the now rare craving for a cigar...I can mix my own juice out of substances I feel comfortable consuming and enjoy the social and physical act of smoking without addictive nicotine”*(Male, 25, AGD, 0 mg/mL).

One area for future research is the idea of e-cig use as a hobby, which included statements describing e-cig use as *“a personalized habit that is very easy to turn into a hobby, and at a fairly cheap price at that”*(Male, 25, AGD, 6 mg/mL) and *“they are a hobby, a pleasure, and involve a community which centers around not only smoking, but modification, customization and construction of these relatively simple devices”*(Male, 25, AGD, 0 mg/mL). One participant also brought up how environmental impact can influence device choices when stating *“I think that environmental accountability is important. As such I prefer to use refillable apparatuses such as tanks because I do not like the idea of throwing away a component to sit in a landfill”*(Male, 25, AGD, 0 mg/mL).

#### 4. DISCUSSION

An important finding from this study is that 63% of e-cig users who were never cigarette smokers had used other traditional tobacco products such as cigars, hookah, pipes, and chew. When analyzing e-cig use prevalence in never smoking populations, it is important to collect data on other traditional tobacco product use, in addition to cigarettes. In our population, e-cig users who were never tobacco users of any kind constituted <1% of overall respondents. Our data suggests that without considering other tobacco product use, the concern regarding NCS initiating e-cig use may be overstated as many of these users are likely not new to nicotine addiction and may in fact be using e-cigs as an alternative to traditional tobacco products. A survey of 832 young adult e-cig users including 67 e-cig users who were NCS also found that a majority of the NCS had used other tobacco products such as hookah, small cigars, or smokeless tobacco, which is in agreement with what we found here (Berg, 2016). Although Bunnell et al., found that 20% of adolescent e-cig users were initiating tobacco product use with e-cigs we found that even with our NCS having a significantly lower age than ECS a majority of them had used other tobacco products (Bunnell et al., 2015). Another consideration is that among NTU (n=41), four participants (10%) were using e-cigs with zero nicotine concentration e-liquid. Farsalinos et al. conducted a study including 88 e-cig users who were never cigarette smokers and found that 53.4% were using non-nicotine containing e-liquids (Farsalinos et al., 2014). This finding highlights the importance of collecting data on the specifics of e-liquids being used since those who are using non-



nicotine e-liquid, particularly those with no history of other tobacco use, are still not initiating nicotine dependence through e-cig use.

Through both the quantitative and qualitative data regarding reasons for use, our data suggest that both traditional tobacco users (TTU) and never tobacco users (NTU) view e-cigs as less harmful than traditional tobacco products. This is in agreement with what other studies have found regarding e-cig users' perceptions (Farsalinos et al., 2014; Grana & Ling, 2014; Wackowski & Delnevo, 2015). This could be partially due to the health claims implied by manufacturers (Grana & Ling, 2014) or the judgements of experts or medical organizations which have concluded that while some ambiguities remain regarding e-cig use (Cervellati et al., 2014; Goel et al., 2015), e-cigs are likely up to 95% safer than combustible cigarettes (Nutt et al., 2014; Royal College of Physicians, 2016).

It seems that both TTU and NTU have similar overarching reasons for using e-cigs and appear to be looking for a way to consume nicotine in a way that they consider safer than traditional tobacco products. Some have suggested social influence can have an important impact on smoking behavior, particularly in adolescents (Simons-Morton & Farhat, 2010). If this is the case for adults as well, for those who engage in social contexts where smoking is highly prevalent, e-cig use may be a way for them to feel they fit in while still avoiding the known harm of combustible cigarettes. This idea is supported by the qualitative responses found in Section 3.1.1 where NTU indicate that they are comfortable with using e-cigs but would not consider smoking cigarettes. In some cases, participants indicate that they feel such social pressure to smoke traditional cigarettes that they use e-cigs to abate this temptation.

It is interesting to note that there are many differences between never cigarette smokers (NCS) and ever cigarette smokers (ECS) in terms of their e-cig use patterns. ECS seem to be more established e-cig users who use their e-cigs more frequently and are more dependent. One possible explanation for this is that NCS are experimenting with the e-cig, whereas ECS are already nicotine dependent and rely more heavily on the product to satisfy an established addiction. This supports what we have found previously, which is that previous cigarette dependence is a strong predictor of e-cig dependence (Foulds et al., 2015). Within the NCS group there are few differences between TTU and NTU. The only significant demographic differences between groups were that TTU were more likely to be male and have lower levels of education. However, this is to be expected as the prevalence of tobacco use is higher in both males and those with lower levels of education (Ahmed et al., 2015). It was also found that NTU had a significantly shorter time to first e-cig use than TTU. However, when looking at overall e-cig dependence via the Penn State E-cig Dependence Index, there was not a statistically significant difference in dependence between the two groups.

Although the overall sample size was large, one limitation of this study is the small, non-generalizable sample of qualitative responses which may not have allowed us to capture all possible themes when analyzing the data. While this was not a nationally representative sample, it did contain a similar proportion of NCS to the nationally representative sample from the McMillen et al. study of e-cig users in 2013 (McMillen et al., 2015). Another limitation is that all data was self-reported and due to the nature of the tobacco use

questions, it is possible that NCS participants had tried a tobacco product briefly in the past without considering themselves users. However, where there were conflicting answers, full survey responses were analyzed to avoid misclassification of smoking status.

Furthermore, the survey was cross-sectional and thus cannot determine the time sequence of tobacco product use and e-cig use, but we were able to triangulate our quantitative tobacco product use data with qualitative responses stating that TTU were using e-cigs to reduce traditional tobacco use which implies that they were using traditional tobacco products prior to e-cig initiation. In future research it would be helpful to explicitly ask about length of use and date of initiation of all nicotine containing products to confirm the sequence of traditional tobacco product and e-cig use. Finally, this was a study of adults and thus the relationship between e-cig use and tobacco product initiation may be different in youth populations (Leventhal et al., 2015).

This study can be viewed as a first step in understanding this relatively small group of e-cig users. With that in mind, one area researchers may wish to explore further is the subset of individuals who use e-cigs to fit into a familial smoking culture. This could include investigating the validity of the claim that e-cigs may be a “gateway” to smoking since our data suggests that e-cig users may be using e-cigs to avoid smoking traditional cigarettes in cultures where traditional cigarette smoking is the norm. Another topic to investigate would be NTU who state that they use their e-cig as a dietary aid, to avoid snacking. Interestingly, not all of these participants indicated using nicotine containing e-cigs and thus may be using flavored e-cigs to curb snack cravings rather than using nicotine as an appetite suppressant. A final topic for consideration is the idea that e-cigs are considered personal expression through design choices or as hobbies. There is a vast array of options available for customizing e-cigs which could be creating an appeal to non-smokers because there is a hobby element to e-cigs not previously found in traditional cigarettes. Similar findings from Berg that NCS are more likely than ECS to state that they use e-cigs for the following reasons: “people who are important to me use them”, “I use them to manage my weight”, and “I like socializing with other users”, suggest that these hypotheses warrant further research (Berg, 2016).

#### 4.1 Conclusion

Our data show that 63% of e-cig users who were never cigarette smokers had used traditional tobacco products aside from cigarettes. In our sample of 6,157 e-cig users, <1% had never been tobacco users of any kind. It is important to collect a complete tobacco use history when analyzing e-cig use in NCS as they may not be initiating nicotine use or dependence through e-cig use. In addition, our qualitative data suggest that NCS view e-cigs as less harmful than cigarettes and TTU may be using e-cigs as a way to reduce use of potentially more harmful tobacco products such as cigars, hookah, pipes, and chew. NTU in particular indicate in their qualitative responses that wanting to experience nicotine in a less harmful way than combustible cigarettes or wanting to fit in with a familial smoking culture may contribute to e-cig use. Further topics for qualitative research to investigate include NCS using e-cigs as a weight management tool, and how the hobby element and design choices of e-cigs may influence use. Better understanding this population’s history of use of



all nicotine/tobacco products and reasons for e-cig use, particularly within longitudinal studies, will shed light on the critical question of why NCS are using e-cigs and how e-cig use influences other tobacco use.

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## Abbreviations

<b>NCS</b>	never cigarette smokers
<b>ECS</b>	ever cigarette smokers
<b>FGD</b>	first generation device
<b>AGD</b>	advanced generation device
<b>NTU</b>	never tobacco users
<b>TTU</b>	traditional tobacco users

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**Highlights**

- Less than 2% of adult e-cigarette users were never cigarette smokers
- 63% of e-cig users who were never cigarette smokers had used other tobacco products
- Studies of e-cig use should collect a full tobacco use history
- Never cigarette smokers may use e-cigs to reduce other tobacco product use

**Table 1**

Sample characteristics by smoking status

	Ever Cigarette Smokers (n=6047)	Never Cigarette Smokers (n=110)	P-value
Mean age (SD)	40.5 (12.8)	29.1 (12.0)	<.0001
Male, n (%)	4123 (68.2)	81 (73.6)	0.22
White, n (%)	5516 (91.2)	89 (80.9)	0.0002
College degree or higher, n (%) <sup>a</sup>	2494 (41.3)	56 (50.9)	0.04
Mean days used in past 28 days (SD) <sup>b</sup>	24 (8)	18 (10.8)	<.0001
Median times used per day (range) <sup>b</sup>	14 (0–144)	3.5 (0–100)	<.0001
Median length of time used, in months (range) <sup>a</sup>	6 (0–84)	2.5 (0–45)	<.0001
Using advanced generation device, n (%)	4192 (69.3)	50 (45.5)	<.0001
Mean Nicotine Concentration, mg/mL <sup>c</sup> (SD)	16.4 (9.2)	14.8 (13.8)	0.22
Using zero nicotine concentration e-liquid, n (%)	113 (1.9)	14 (12.7)	<.0001
Median time to first use in minutes (range) <sup>d</sup>	30 (0–960)	75 (0–800)	<.0001
Mean Penn State E-cig Dependence Index Score (SD) <sup>de</sup>	7.8 (3.6)	3.7 (2.9)	<.0001
Switched to current e-cig because of more satisfying hit, n (%)	4186 (69.2)	39 (35.5)	<.0001
View flavor as important, n (%) <sup>fg</sup>	4948 (82.3)	94 (86.2)	0.29
View cigarette shape as important, n (%) <sup>fh</sup>	1971 (32.8)	49 (44.6)	0.01
View fast battery charge as important, n (%) <sup>i</sup>	4598 (76.7)	74 (67.9)	0.03
View long battery life as important, n (%) <sup>i</sup>	5747 (95.8)	99 (90.8)	0.03
View good vapor quality as important, n (%) <sup>k</sup>	5892 (98.6)	103 (96.3)	0.07

Notes:

<sup>a</sup> 1 missing from ever cigarette smokers group<sup>b</sup> 3 missing from ever cigarette smokers group<sup>c</sup> 248 missing from ever cigarette smokers group and 8 missing from never cigarette smokers group

<sup>d</sup> 2 missing from ever cigarette smokers group and 1 missing from never cigarette smokers group

<sup>e</sup> E-cig Penn State Dependence Index Score Range: 1–20;

<sup>f</sup> response options of “a little” or “very” important as compared to “not important”

<sup>g</sup> 35 missing in ever cigarette smokers group and 1 missing in never cigarette smokers group

<sup>h</sup> 30 missing in ever cigarette smokers group

<sup>i</sup> 49 missing in ever cigarette smokers group and 1 missing in NCS group

<sup>j</sup> 50 missing in ever cigarette smokers group and 1 missing in never cigarette smokers group

<sup>k</sup> 70 missing in ever cigarette smokers group and 3 missing in never cigarette smokers group

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**Table 2**

Primary reasons for e-cigarette use among never cigarette smokers by history of other traditional tobacco product use

	<b>Never tobacco users (NTU) (n=41)</b>	<b>Ever traditional tobacco users (TTU)(n=69)</b>
Less harmful to self and others, n (%)	22 (54)	34 (49)
Prefer taste of e-cigarettes, n (%)	10 (24)	15 (22)
As an alternative to smoking, n (%)	6 (15)	11 (16)
Cost, n (%)	1 (2)	1 (2)
To quit or reduce to quit, n (%)	0	5 (7)
Other, n (%)	2 (5)	3 (4)

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**Table 3**

Qualitative response themes among never cigarette smokers

<p><b>Health and Safety (Never Traditional Tobacco Users)</b></p> <ul style="list-style-type: none"><li>• Wanted to try tobacco without the harmful effects</li><li>• Wanted a safer way to affiliate with smoking culture of friends and family</li></ul> <p><b>Reducing Other Tobacco Product Use (Ever Traditional Tobacco Users)</b></p> <ul style="list-style-type: none"><li>• Using e-cig as an alternative to other tobacco product use</li><li>• Using e-cig to cut down on other tobacco product use</li></ul> <p><b>Topics for Future Research</b></p> <ul style="list-style-type: none"><li>• Using e-cigs as a dietary aid</li><li>• Hobby/social element of e-cig use and design choices</li></ul>
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