Article

Reasons for Starting and Stopping Electronic Cigarette Use

Jessica K. Pepper [1,2,*], Kurt M. Ribisl [1,2], Sherry L. Emery [3] and Noel T. Brewer [1,2]

[1] Lineberger Comprehensive Cancer Center, University of North Carolina, Campus Box 7295, Chapel Hill, NC 27599, USA; E-Mails: kurt_ribisl@unc.edu (K.M.R.); ntb@unc.edu (N.T.B.)

[2] Department of Health Behavior, University of North Carolina, Campus Box 7440, Chapel Hill, NC 27599, USA

[3] Institute for Health Research and Policy, University of Illinois at Chicago, 528 Westside Research Office Bldg., 1747 West Roosevelt Road, Chicago, IL 60608, USA; E-Mail: slemery@uic.edu

* Author to whom correspondence should be addressed; E-Mail: pepper@unc.edu;
  Tel.: +1-919-966-8650; Fax: +1-919-966-2921.

Abstract: The aim of our study was to explore reasons for starting and then stopping electronic cigarette (e-cigarette) use. Among a national sample of 3878 U.S. adults who reported ever trying e-cigarettes, the most common reasons for trying were curiosity (53%); because a friend or family member used, gave, or offered e-cigarettes (34%); and quitting or reducing smoking (30%). Nearly two-thirds (65%) of people who started using e-cigarettes later stopped using them. Discontinuation was more common among those whose main reason for trying was not goal-oriented (e.g., curiosity) than goal-oriented (e.g., quitting smoking) (81% *vs.* 45%, *p* < 0.001). The most common reasons for stopping e-cigarette use were that respondents were just experimenting (49%), using e-cigarettes did not feel like smoking cigarettes (15%), and users did not like the taste (14%). Our results suggest there are two categories of e-cigarette users: those who try for goal-oriented reasons and typically continue using and those who try for non-goal-oriented reasons and then typically stop using. Research should distinguish e-cigarette experimenters from motivated users whose decisions to discontinue relate to the utility or experience of use. Depending on whether e-cigarettes prove to be effective smoking cessation tools or

whether they deter cessation, public health programs may need distinct strategies to reach and influence different types of users.

Keywords: electronic cigarettes; e-cigarettes; tobacco use; smoking cessation

1. Introduction

The popularity of electronic cigarettes (e-cigarettes) in the United States has increased dramatically in recent years. Less than 1% of U.S. adults reported ever trying e-cigarettes in 2009 [1]; in 2013, 15% reported ever trying them [2]. Use of e-cigarettes by smokers is particularly high. In a 2013 national U.S. survey, half of smokers reported ever trying e-cigarettes, and 21% reported currently using them some days or every day [3]. Use by smokers is similarly high in other countries [4,5]. For instance, more than one-third (37%) of current smokers and recent ex-smokers in Great Britain reported ever use of e-cigarettes in 2012, and 21% currently used them [6].

Among the most common reasons for using e-cigarettes are believing they are healthier than regular cigarettes and can help smokers quit or reduce smoking [7]. Because e-cigarettes do not rely on combustion or contain cured tobacco, they produce far fewer harmful constituents than regular cigarettes [8]. However, some studies of e-cigarette aerosol and e-liquid have detected formaldehyde, nitrosamines, and other harmful constituents in amounts that varied considerably across brands, flavors, and models [9–11]. The extent to which e-cigarettes help smokers quit is still unclear [12–14]. One randomized-controlled trial found similar cessation success rates for e-cigarettes and the nicotine patch [15]. Some population-based studies indicate that e-cigarettes can help smokers quit [16], while others do not [17,18]. Other reported reasons for trying or using e-cigarettes are avoiding smoking restrictions [19–21], alleviating cravings for nicotine [20,22], enjoying the flavors [23], and preventing others' exposure to cigarette smoke [21].

There is little research on stopping use of e-cigarettes outside of surveys with purposeful sampling of e-cigarette users from online forums [20,22] or smokers exiting tobacco shops [24]. It is important to understand why people stop using e-cigarettes for multiple reasons. First, e-cigarettes may provide an opportunity for harm reduction should nicotine-addicted smokers be willing to switch from regular cigarettes to non-combustible electronic ones. Only if switching is both successful and widespread would their use offer a net public health benefit. Second, understanding who stops using e-cigarettes and why allows researchers to distinguish among user types. Just as there are subtypes of cigarette smokers, like "social smokers" [25], subtypes of e-cigarette users may also exist. Reaching the right users with the right messages is critical for the success of any future public health campaigns focused on e-cigarettes. The aim of the present study was to investigate reasons for starting and stopping use of e-cigarettes and to examine differences in discontinuation by reason for trying among a large, population-based sample of U.S. adults.

2. Methods

2.1. Sample

This survey relied on data collected as part of the Tobacco Control in a Rapidly Changing Media Environment (TCME) study. The TCME project examined the relationship between recall of receiving tobacco-related information through multiple media channels and tobacco-related attitudes, beliefs, and behavior. In March 2013, 17,522 U.S. adult TCME participants completed an online survey. Most respondents (75%) were members of KnowledgePanel, a nationally representative online survey panel constructed using random-digit dialing, supplemented by address-based sampling to capture cell phone-only households. The remainder of the sample constituted members of a separate consumer survey panel recruited through online ads for joining the panel. The survey company screened individuals who were part of this consumer sample based on demographics and tobacco use behaviors and issued invitations to this survey in order to quota match with the KnowledgePanel sample. KnowledgePanel members received monthly compensation for being part of the panel (usually as points redeemable for $4–6 of goods) as well as entry into a sweepstakes with an additional cash or prize reward for completing this specific survey. Respondents from the separate consumer panel received points worth up to $2 for taking this survey. Before taking the survey, all participants provided consent online. Of the 34,097 KnowledgePanel members surveyed, 61% completed the screening; among those who were eligible (*n* = 13,531), 97% completed the survey. Response rates for the convenience sample cannot be calculated because there is no known sampling frame. For this study, we report data only from the 3878 participants who reported ever having tried an e-cigarette. Institutional review boards at the University of Illinois and the National Cancer Institute approved the study.

2.2. Measures

While viewing generic images of e-cigarettes, participants read an introductory statement: "The next questions are about electronic cigarettes, often called e-cigarettes. An e-cigarette looks like a regular cigarette, but it runs on a battery and produces vapor instead of smoke. There are many types of e-cigarettes. Some common brands are Smoking Everywhere, NJOY, Blu, and Vapor King. Below are some pictures of e-cigarettes." Participants who were aware of e-cigarettes (assessed with the item, "Before today, had you ever heard of e-cigarettes?") answered items about ever use ("Have you ever used an e-cigarette, even one puff?") and current use ("Do you now use e-cigarettes every day, some days, or not at all?"). We defined "trying" or "starting" as ever use and "current use" as using e-cigarettes either every day or some days. We defined "stopping" or "discontinuing" as ever use without current use.

One survey item assessed reasons for trying e-cigarettes: "What are the reasons you first tried e-cigarettes? (check all that apply)." The response options were: they are affordable; I can use them in places where smoking cigarettes isn't allowed; they might be less harmful to me than regular cigarettes; they might be less harmful to people around me than regular cigarettes; e-cigarettes come in flavors I like; e-cigarettes can help me quit or cut back on smoking regular cigarettes; e-cigarettes don't smell bad; using an e-cigarette feels like smoking a regular cigarette; e-cigarettes don't bother

people who don't use tobacco; the advertising for e-cigarettes appeals to me; they help me deal with cravings to smoke; I have a friend or family member who uses e-cigarettes; I was curious about e-cigarettes; I received an e-cigarette as a holiday gift; I made a New Year's resolution to quit smoking regular cigarettes; and other (please specify). We recoded open-ended responses that clearly fit into one of the available response options. For example, we recoded a response of "So I can quit smoking" into the category "e-cigarettes can help me quit or cut back on smoking regular cigarettes".

Based on the responses to the open-ended item, we created an omnibus category for the reason "a friend or family member used, gave, or offered e-cigarettes"; this category included positive responses for "I have a friend or family member who uses e-cigarettes", "I received an e-cigarette as a holiday gift", and any open-ended responses mentioning a gift or offer from a friend or family member. We also asked respondents to select the main reason they tried e-cigarettes out of all of the reasons they selected on the previous item. We categorized the main reason as "non-goal-oriented" if respondents said they tried e-cigarettes because of curiosity, a friend or family member, liking the ads, other (non-recoded responses), or said they did not know. We classified the remaining main reasons (e.g., stopping or reducing smoking, using where smoking is not allowed) as "goal-oriented".

Another survey item assessed reasons for stopping e-cigarette use, among those who reported no longer using them: "What are the reasons you stopped using e-cigarettes? (check all that apply)." Response options were: e-cigarettes cost too much money; I didn't like how they tasted; using e-cigarettes didn't help me deal with cravings to smoke; using e-cigarettes didn't help me quit or cut back on smoking regular cigarettes; using e-cigarettes didn't feel like smoking regular cigarettes; e-cigarettes are poor quality, defective, or break easily; I was concerned about the health risks caused by using e-cigarettes; I didn't like the side effects of using them; I was just experimenting with e-cigarettes; and other (please specify). Again, we recoded open-ended responses that clearly fit into one of the available response options.

The survey also assessed use of regular cigarettes, gender, age, education, race and ethnicity, marital status, employment, region of residence, and household income. We classified "non-smokers" as those who had smoked fewer than 100 cigarettes in their lifetimes and "former smokers" as those who smoked 100 or more cigarettes but did not currently smoke. Current daily and non-daily smokers received a question about their intentions to quit ("Do you plan to quit smoking for good…?" with six response options: in the next 7 days, in the next 30 days, in the next 6 months, in the next year, more than one year from now, or I do not plan to quit smoking for good). To assess understanding and appropriateness of item wording and ease of responding to survey items, we conducted cognitive interviews and refined the list of reasons for starting and stopping use of e-cigarettes based on this feedback. We pre-tested the revised survey with 160 respondents. For all variables, we recoded missing scores (<0.5% for each item) to the mean or mode of that item.

2.3. Data Analysis

We examined bivariate associations between respondent characteristics and the three most common reasons for trying e-cigarettes using logistic regression. We included all statistically significant bivariate correlates ($p < 0.05$) in a multivariate model. We used the same procedure to examine associations between respondent characteristics and stopping use of e-cigarettes. To compare rates of

discontinuation among those who tried e-cigarettes for goal-oriented *vs.* non-goal-oriented reasons, we conducted an additional logistic regression with discontinuation as the dependent variable and reason type (goal-oriented *vs.* non-goal-oriented) as the independent variable. Analyses were run in Stata Version 12. Frequencies are unweighted. Percentages and all other analyses used the "svy" command and post-stratification weights to adjust for the representativeness of the sample compared to the U.S. population and the sampling design, including the combination of probability and non-probability samples. Statistical tests were two-tailed with a critical alpha of 0.05.

3. Results

3.1. Participant Characteristics

Most participants (*n* = 3878 ever users of e-cigarettes) were non-Hispanic White (71%), married or living with a partner (57%), and under age 45 (56%) (Table 1). About half were female (51%) and had at least some college education (51%). Most participants were current daily or non-daily smokers (61% and 11%, respectively) or former smokers (19%). Most smokers intended to quit either in the next year (26%) or more than one year from now (58%), but 16% did not intend to quit.

Table 1. Sample characteristics (*n* = 3878 e-cigarette ever users).

Characteristic	*n*	Weighted%
Participant		
Gender		
Male	1544	49.2%
Female	2334	50.8%
Age		
18–24	520	14.6%
25–34	878	27.5%
35–44	585	14.0%
45–54	789	23.5%
55–64	712	13.5%
65 or older	394	6.9%
Education		
Less than high school	213	8.9%
High school	995	39.9%
Some college	1837	36.8%
Bachelor's degree or higher	833	14.3%
Smoking status		
Non-smoker [a]	158	9.7%
Former smoker [b]	392	18.7%
Current non-daily smoker	466	10.7%
Current daily smoker	2862	60.9%
Intention to quit smoking [c]		
In the next year	850	26.3%
More than 1 year from now	2003	58.3%
Do not plan to quit	475	15.5%

Table 1. *Cont.*

Characteristic	*n*	Weighted%
E-cigarette use		
Former user	2281	65.2%
Current user [d]	1597	34.8%
Race/ethnicity		
Non-Hispanic White	3072	71.0%
Non-Hispanic Black	248	9.2%
Non-Hispanic other race or >1 race	259	6.7%
Hispanic	299	13.2%
Marital status		
Married or living with partner	2169	57.1%
Widowed	145	3.0%
Divorced or separated	714	16.3%
Never married	850	23.6%
Employment		
Working	2150	59.2%
Not working: laid off or looking for work	517	14.2%
Not working: retired, disabled, or other	1211	26.6%
Household		
Region		
Midwest	955	23.5%
Northeast	608	14.6%
South	1360	39.7%
West	955	22.2%
Household income		
Less than $25,000	1130	26.1%
$25,000–$49,999	1153	25.0%
$50,000–$74,999	793	19.6%
$75,000–$99,999	415	16.0%
$100,000 or more	387	13.2%

Notes: [a] Smoked less than 100 cigarettes in lifetime; [b] Smoked 100 or more cigarettes in lifetime but does not currently smoke; [c] Among current smokers (*n* = 3328); [d] Uses e-cigarettes some days or every day.

3.2. Starting E-Cigarette Use

The most common reasons for starting e-cigarette use were curiosity (53%), a friend or family member used, gave, or offered an e-cigarette (34%), and to quit or cut back on smoking (30%) (Figure 1). Other common reasons for trying e-cigarettes included believing that e-cigarettes were less harmful to the user than regular cigarettes (29%), could be used in places where smoking is not allowed (26%), or were less harmful to others (23%). In open-ended responses, 21 participants (0.4%) noted that they started using e-cigarettes because of price promotions or free samples.

Figure 1. Reasons for trying e-cigarettes (ECs) (multiple answers allowed) and percent stopping EC use among those who endorsed that reason (*n* = 3878).
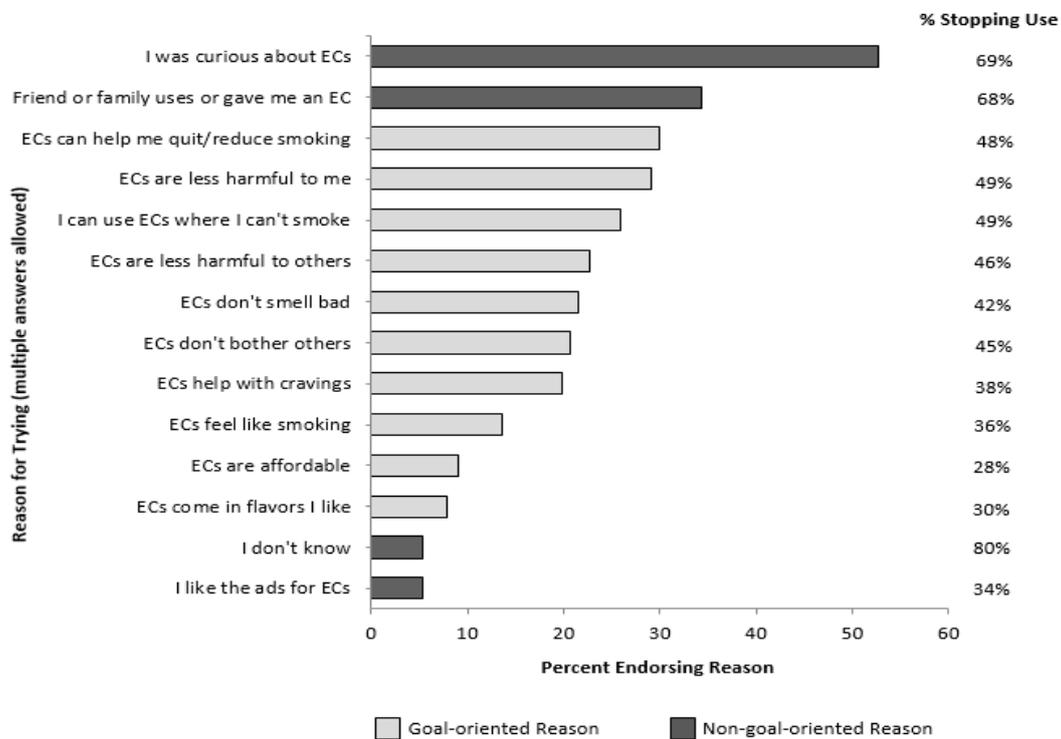
In multivariate regression analyses, few demographic variables predicted the most common reasons for trying e-cigarettes. Those with some college education were more likely than those with less than a high school education to try e-cigarettes because of curiosity (57.2% *vs*. 40.7%, OR 1.83, 95% CI 1.20, 2.81). Women were more likely than men to report trying e-cigarettes because a friend or family member used, gave, or offered them (38.4% *vs*. 30.1%, OR 1.45, 95% CI 1.16, 1.82). Hispanic participants were less likely than non-Hispanic White participants to try e-cigarettes in order to quit or cut back on smoking (14.9% *vs*. 33.7%, OR 0.50, 95% CI 0.33, 0.76). Former smokers (24.2%, OR 7.68, 95% CI 2.05, 28.72), current non-daily smokers (26.5%, OR 11.02, 95% CI 2.97, 40.90), and current daily smokers (36.7%, OR 13.90, 95% CI 3.85, 50.22) were all more likely than non-smokers (*i.e.*, those who smoked less than 100 cigarettes in their lifetimes, 3.0%) to try e-cigarette use in order to quit smoking.

3.3. Stopping E-Cigarette Use

Nearly two-thirds (65%) of those who had tried e-cigarettes later discontinued use. People whose main reason for trying e-cigarettes was not goal-oriented were more likely to stop using e-cigarettes than those whose main reason was goal-oriented (81.0% *vs*. 44.7% stopped using, OR 5.28, 95% CI 4.23, 6.58). For example, more than two-thirds of those who tried because of curiosity or the influence of friends or family later discontinued use (69% and 68%, respectively) (Figure 1). However, among participants who tried e-cigarettes in order to quit or cut back on smoking, only 48% discontinued use.

Table 2. Correlates of stopping e-cigarette use (*n* = 2281 former e-cigarette users).

Characteristic	Number Who Stopped Using E-Cigarettes/Total Number in Category (Unweighted *n* and Weighted %)		Bivariate		Multivariate (Includes Bivariate Correlates *p* < 0.05)	
	n	(%)	*OR*	(95% CI)	*OR*	(95% CI)
Overall	2281/3878	(65.2)				
Participant						
Gender						
Male (Ref)	849/1544	(62.7)	1.00	-	1.00	-
Female	1432/2334	(67.7)	1.25	(1.02, 1.54) *	1.23	(1.00, 1.53)
Age						
18–24 (Ref)	306/520	(61.5)	1.00	-		
25–34	473/878	(63.4)	1.08	(0.76, 1.54)		
35–44	337/585	(65.6)	1.20	(0.83, 1.73)		
45–54	475/789	(66.5)	1.24	(0.87, 1.77)		
55–64	442/712	(69.7)	1.44	(1.00, 2.08)		
65 or older	248/394	(66.7)	1.26	(0.80, 1.97)		
Education						
Less than high school (Ref)	118/213	(55.6)	1.00	-	1.00	-
High school	639/995	(69.1)	1.79	(1.17, 2.74) **	1.97	(1.27, 3.05) **
Some college	1086/1837	(64.2)	1.44	(0.95, 2.17)	1.72	(1.12, 2.65) *
Bachelor's degree or higher	438/833	(63.2)	1.37	(0.89, 2.13)	1.66	(1.03, 2.67) *
Smoking status						
Non-smoker (Ref)	126/158	(82.0)	1.00	-	1.00	-
Former smoker	287/392	(82.2)	1.02	(0.51, 2.01)	0.92	(0.46, 1.80)
Current non-daily smoker	225/466	(50.0)	0.22	(0.11, 0.43) ***	0.21	(0.11, 0.40) ***
Current daily smoker	1643/2862	(60.0)	0.33	(0.18, 0.60) ***	0.29	(0.16, 0.52) ***
Race/ethnicity						
Non-Hispanic White (Ref)	1868/3072	(66.3)	1.00	-		
Non-Hispanic Black	136/248	(65.3)	0.96	(0.65, 1.40)		
Non-Hispanic other race or >1 race	138/259	(57.8)	0.69	(0.47, 1.03)		
Hispanic	139/299	(63.1)	0.87	(0.61, 1.25)		

Table 2. *Cont.*

| Characteristic	Number Who Stopped Using E-Cigarettes/Total Number in Category (Unweighted *n* and Weighted %)		Bivariate		Multivariate (Includes Bivariate Correlates *p* < 0.05)	
	n	(%)	OR	(95% CI)	OR	(95% CI)
Marital status						
Married or living with partner (Ref)	1282/2169	(65.6)	1.00	-		
Widowed	82/145	(67.8)	1.10	(0.63, 1.92)		
Divorced or separated	446/714	(69.7)	1.21	(0.90, 1.61)		
Never married	471/850	(61.0)	0.82	(0.63, 1.06)		
Employment						
Working (Ref)	1184/2150	(63.1)	1.00	-	1.00	-
Not working: laid off or looking for work	328/517	(65.4)	1.11	(0.80, 1.52)	1.04	(0.74, 1.49)
Not working: retired, disabled, or other	769/1211	(69.8)	1.35	(1.07, 1.71) *	1.27	(0.98, 1.64)
Household						
Region						
Midwest (Ref)	577/955	(66.0)	1.00	-		
Northeast	339/608	(59.8)	0.77	(0.55, 1.06)		
South	812/1360	(65.7)	0.99	(0.76, 1.28)		
West	553/955	(67.1)	1.05	(0.78, 1.42)		
Annual household income						
Less than $25,000 (Ref)	747/1130	(69.2)	1.00	-	1.00	-
$25,000–$49,999	691/1153	(66.5)	0.88	(0.67, 1.16)	0.89	(0.67, 1.19)
$50,000–$74,999	425/793	(63.8)	0.78	(0.58, 1.06)	0.86	(0.61, 1.20)
$75,000–$99,999	211/415	(60.0)	0.67	(0.47, 0.95) *	0.67	(0.45, 0.99) *
$100,000 or more	207/387	(63.6)	0.77	(0.54, 1.12)	0.69	(0.46, 1.03)

Notes: Multivariate model contains all correlates significant (*p* < 0.05) in bivariate models; OR = odds ratio; CI = confidence interval; Ref = reference category.

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

The choice to stop using e-cigarettes was associated with education, smoking status, and income in multivariate analysis (Table 2). Compared to those with less than a high school education (56% discontinued), individuals with a high school education (69%, OR 1.97, 95% CI 1.27, 3.05), some college education (64%, OR 1.72, 95% CI 1.12, 2.65), or a Bachelor's degree or higher (63%, OR 1.66, 95% CI 1.03, 2.67) were more likely to stop using e-cigarettes. Current non-daily smokers (50% discontinued, OR 0.21, 95% CI 0.11, 0.40) and current daily smokers (60%, OR 0.29, 95% CI 0.16, 0.52) were less likely than non-smokers (82%) to stop using e-cigarettes, but non-smokers and former smokers did not differ. Finally, participants with annual household incomes between $75,000 and $99,999 were less likely than individuals from households with annual incomes of less than $25,000 to stop using e-cigarettes (60% *vs*. 69%, OR 0.67, 95% CI 0.45, 0.99).

The most common reason for stopping use was that the user was just experimenting with e-cigarettes (49%) (Figure 2). The next most common reasons were that using e-cigarettes did not feel like smoking cigarettes (15%), participants did not like the taste of e-cigarettes (14%), or e-cigarettes cost too much (13%). Just over ten percent of participants stopped using e-cigarettes because they did not help with cravings (11%) or did not help the user quit or cut back on smoking (11%), and 12% stated that they did not know why they stopped using e-cigarettes. In the open-ended question, 3% of former
e-cigarette users said they stopped using e-cigarettes because they quit smoking or quit using nicotine.

Figure 2. Reasons for stopping e-cigarette use (*n* = 2281).
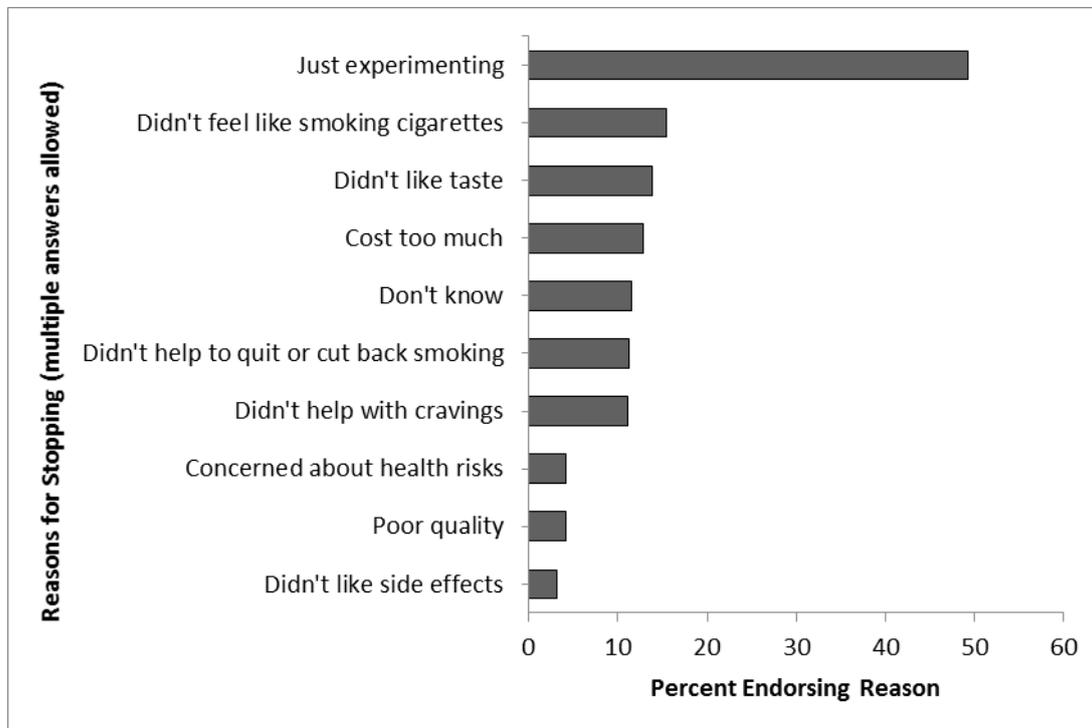
4. Discussion

In this large national study of U.S. adults who had ever used e-cigarettes, the most common reasons for trying e-cigarettes were curiosity, because a friend or family member used, gave, or offered them, and quitting or reducing smoking. Two in three people who tried e-cigarettes later stopped using them,

but this pattern differed by reason for trial. Those whose main reason for trying was goal-oriented had much higher rates of continued use than those who tried for non-goal-oriented reasons like curiosity or the influence of a friend or family member. This pattern suggests there may be distinct subgroups of e-cigarette users with differing experiences of use.

Curiosity, the most common reason for e-cigarette trial, is a natural reason for experimentation. E-cigarettes are a novel product, only introduced in the U.S. market in 2007 [26]. They are widely advertised [27] and covered in the popular media [28–30], both of which help to spread information about and promote experimentation with any innovation [31]. Individuals with higher education tried e-cigarettes because of curiosity more often than those with lower education. Higher education individuals in general are more likely to adopt innovations [31]. In addition, experimentation might be easier in this group because they have greater access to e-cigarettes, which are more available in high socioeconomic status neighborhoods than low socioeconomic status neighborhoods [32]. E-cigarette users also frequently cited the influence of friends or family as a reason for trying the product. Social connections motivate the diffusion of most innovations throughout a population [31]. Smoking behaviors in particular spread through social contacts, partly because similar people gather together in social or family groups [33,34]. Women, who tend to have larger and denser family networks [35] and more intimate friendships [36] than men, were more likely to report the influence of friends or family as a reason for trying e-cigarettes.

In the e-cigarette literature, quitting or reducing smoking is a frequently documented reason for use [7], as we found in this study. Not surprisingly, smokers were more likely than non-smokers to report this as a motivator for trial. Three participants who reported trying e-cigarettes in order to quit smoking met our definition of non-smokers (*i.e.*, smoked less than 100 cigarettes in their lifetime). It is possible that these participants sought to use e-cigarettes in order to curtail their smoking before it became a regular habit. The most common reasons for trial in our study, curiosity and social influence, are less commonly reported in the literature, perhaps because researchers did not allow for these answer choices in closed-ended survey items or because these factors motivated initial trying e-cigarettes but not continued use of e-cigarettes, so they would not be mentioned when asked about reasons for use.

Most respondents who tried e-cigarettes for goal-oriented reasons like smoking cessation or the ability to use e-cigarettes in places where they could not smoke regular cigarettes continued to use them, while those who started for non-goal-oriented reasons like curiosity later stopped using them. We suspect that those who try e-cigarette use for non-goal-oriented reasons have no intention to use them on a regular basis, perhaps because they do not personally identify with the image in their mind of the typical e-cigarette user. Individuals who have positive prototypes of cigarette smokers and identify with those prototypes are more susceptible to smoking [37] and more likely to relapse after quitting [38], and holding more negative beliefs about a typical cigarette smoker is associated with lower interest in trying e-cigarettes [39]. In contrast, only about 20% of those who tried e-cigarettes for goal-directed reasons, most commonly smoking cessation and harm reduction, discontinued use. Value expectancy models of health behavior, such as the Health Belief Model [40], focus on rational, goal-directed behavior. These models describe willingness to engage in health-protective behavior as related to the desire to avoid illness and the belief that this behavior would prevent that illness. Individuals who try e-cigarettes for smoking cessation or harm reduction (the two most common goal-oriented reasons in this study) may be explicitly or implicitly trying to reduce their chances of

developing a smoking related-illness. Among this group, those who then discontinue might do so because the product did not help them achieve their goals (*e.g.*, smoking cessation) or because negative experiences (*e.g.*, bad taste) overrode their goal. Those who continue to use might feel that e-cigarettes are helping them to smoke less or they enjoy the experience of using e-cigarettes once having tried them for cessation reasons.

In general, discontinuation was less common among smokers and more common among those with higher education. This pattern likely reflects the differences in reasons for trial. Individuals with higher education are more likely to try e-cigarettes because of curiosity and then discontinue because they were merely experimenting. Smokers were more likely to try e-cigarettes as a means to quit smoking and then continue to use them for the goal-related reasons described above. After experimentation, the next most common reasons for stopping use were that e-cigarettes did not feel like regular tobacco cigarettes and users did not like their taste. Most e-cigarette users are smokers [7,41,42]. If they are interested in electronic cigarettes as a direct substitute for regular ones, they may be disappointed. Some smokers say that e-cigarettes do not feel like or taste like the "real thing" [22]. Indeed, one frequent response in the open-ended field was that e-cigarettes were "too heavy," presumably in comparison to the weight of regular cigarettes that smokers are accustomed to. In the meantime, e-cigarette technology and design are improving (*e.g.*, stronger batteries, options for user customization), and this trend will likely continue as multinational tobacco corporations invest in the e-cigarette market. Newer models might be more appealing to smokers, and dissatisfaction with feel, taste, or cost may decline. If newer models deliver nicotine more efficiently, fewer smokers might discontinue use because of failure to help manage their cravings. Better products might also be better cessation tools, reducing the number of smokers who stop using because the product fails to help them quit. Alternatively, there may be more smokers who stop using the product because they used it to successfully help them quit nicotine altogether. In the present study, only a small number of respondents reported discontinuing use for that reason.

The present results suggest two distinct groups of e-cigarette users: casual experimenters who almost always stop using and motivated users whose discontinuation decisions relate to the utility or experience of using e-cigarettes. This distinction has implications for research, specifically measurement. Researchers typically report and examine correlates of "ever use" of e-cigarettes. However, "ever users" appear to comprise two different groups. Finer-grained measurement is needed. To distinguish these groups, researchers might assess the number of instances of previous use and rely on a cut-off point for defining ever use as is currently done for established smoking, which is typically defined as having smoked at least 100 cigarettes in a lifetime.

The distinction between casual experimenters and motivated users also has implications for public health practice. If research can identify why certain vulnerable groups are attracted to and start using e-cigarettes (*e.g.*, youth find the candy and fruit flavors appealing), public health campaigns can deliver more effective counter-messages when appropriate. In this sample, the most common reason for trying e-cigarettes was the same among smokers and non-smokers: curiosity. Reducing the appeal of e-cigarettes (*e.g.*, restricting advertising that makes e-cigarettes seem glamorous) or making the product more difficult to obtain might deter non-smokers from trying the product out of mere curiosity.

Ultimately, the extent to which practitioners treat these two groups of e-cigarette users differently will likely depend on whether studies find that e-cigarettes can help smokers quit. If e-cigarettes do not

help smokers quit or have other detrimental effects on public health (e.g., lead to smoking initiation among non-smokers), distinguishing casual experimenters from motivated users could be helpful, as these groups might need different strategies for discouraging use. Alternatively, if future studies show that e-cigarettes are useful cessation tools, practitioners will also need to distinguish between the two types of users. They will need to establish which reasons for trying e-cigarettes are linked to successful smoking cessation. If some reasons for trying (e.g., curiosity, social influence) are not associated with cessation, practitioners should discourage use among individuals who are motivated by those reasons. Should e-cigarettes prove to be useful cessation tools, regulators will also need to ensure that any future policies, such as advertising restrictions, are balanced to ensure that ads can still reach smokers who would use the product as a smoking substitute. In any case, the degree to which e-cigarettes could serve as a harm reduction tool at the population level will depend on the trial and discontinuation choices of different user types.

Limitations to our study include that the TCME survey described e-cigarettes as looking like regular cigarettes, as was the case with first generation models. As e-cigarettes now comprise a class of electronic nicotine delivery devices that do not always look like cigarettes or go by the name "e-cigarettes," some participants might have misidentified themselves as "never users" because the product they had tried was not called an "e-cigarette" or did not look like a cigarette. Measuring the degree of endorsement of different reasons using more than two responses would have allowed finer-grained analysis. In addition, this study was cross-sectional and assessed only reasons for first trial. Thus, participants' recollections of their reasons for first trying e-cigarettes could be subject to recall bias. Further, we could not identify participants who intended to stop using e-cigarettes but had not yet done so and could not examine the reasons for the most recent use among participants who had used e-cigarettes repeatedly. We also could not determine whether stated reasons for trying e-cigarettes prompted later changes in behavior, e.g., whether those who tried e-cigarettes in order to quit smoking actually did so. The study data reflect probability and non-probability samples, but the use of quota sampling and survey weights enabled us to align our estimates with the U.S. population. During survey design, we cognitively tested the survey instrument, but we may have missed some response options for reasons to start and stop using e-cigarettes, such as completely quitting nicotine. The partial overlap between some of the established categories (e.g., a friend or family member uses e-cigarettes) and some of the open-ended responses (e.g., a friend or family member offered a puff of an e-cigarette) suggests that response options could have been more precise. Strengths of the study include the large national sample, extensive formative work, and novel research questions.

5. Conclusions

Few studies have examined reasons for stopping e-cigarette use, despite the fact that most of those who try e-cigarettes discontinue. Understanding these reasons has important public health implications if it helps to segment the population. Not all "ever e-cigarette users" are the same, just as not all cigarette smokers are the same. For example, tobacco control researchers emphasize the need to distinguish between "social smokers" who say they are not addicted to nicotine and those who self-categorize as nicotine-addicted smokers [25]. The extent to which e-cigarette users try the product because they are trying to achieve a goal like smoking cessation appears to be one driver of patterns of

discontinuation. Specifically, those who try for goal-oriented reasons are more likely to continue using, but when they do stop using, they do so for reasons related to product satisfaction. If e-cigarettes are to serve as a harm reduction tool with an overall public health benefit, smokers who try for cessation and health-related reasons will need to be sufficiently satisfied with the product so that they switch completely and not merely experiment with it or engage in dual use. Segmentation between goal-oriented and non-goal-oriented users allows for health interventions to better target users' needs and objectives and thus be more successful [43]. The type of future intervention efforts needed for adult e-cigarette users is uncertain, pending conclusive research on the controversial issue of whether the product can help with smoking cessation. However, even without such data, the need to prevent initiation among youth is clear. Future research should build on this study's findings and explore adolescents' and young adults' reasons for starting and stopping e-cigarette use, as this could help to design programs that prevent e-cigarettes from serving as a gateway to future smoking.

Author Contributions

Jessica K. Pepper, Noel T. Brewer, and Kurt M. Ribisl conceptualized the manuscript's focus and analyses. Sherry L. Emery designed and executed the parent project and assisted with survey item development. Jessica K. Pepper conducted the analyses and drafted the manuscript. Noel T. Brewer, Kurt M. Ribisl, and Sherry L. Emery edited the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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