



Reasons for current E-cigarette use among U.S. adults



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ARTICLE INFO

Article history:

Received 14 May 2016

Received in revised form 5 August 2016

Accepted 5 September 2016

Available online 7 September 2016

Keywords:

Electronic cigarettes

Adult

Nicotine

ABSTRACT

E-cigarette use has increased rapidly among U.S. adults. However, reasons for use among adults are unclear. We assessed reasons for e-cigarette use among a national sample of U.S. adults. Data were collected via online surveys among U.S. adults aged 18 or older from April through June 2014. Descriptive and multivariate regression analyses were conducted to assess reasons for e-cigarette use among 2448 current e-cigarette users, by sociodemographic characteristics and product type. Assessed reasons included cessation/health, consideration of others, convenience, cost, curiosity, flavoring, and simulation of conventional cigarettes. Among current e-cigarette users, 93% were also current cigarette smokers. The most common reasons for e-cigarette use were cessation/health (84.5%), consideration of others (71.5%), and convenience (56.7%). The prevalence of citing convenience (adjusted prevalence ratio [aPR] = 1.49) and curiosity (aPR = 1.54) as reasons for e-cigarette use were greater among current cigarette smokers than nonsmokers ($P < 0.05$). The prevalence of citing flavoring as a reason for use was greater among adults aged 18 to 24 (aPR = 2.02) than 55 or older ($P < 0.05$). Tank use was associated with greater prevalence of citing every assessed reason except convenience and curiosity. Cessation- and health-related factors are primary reasons cited for e-cigarette use among adults, and flavorings are more commonly cited by younger adults. Efforts are warranted to provide consumers with accurate information on the health effects of e-cigarettes and to ensure that flavoring and other unregulated features do not promote nicotine addiction, particularly among young adults.

Published by Elsevier Inc.

1. Introduction

Electronic nicotine delivery systems (ENDS), including e-cigarettes, are a rapidly emerging product in the United States. ENDS are battery-powered devices that heat a liquid-containing cartridge to produce an aerosol that is inhaled by the user (Grana et al., 2014). One of the most common types of ENDS is e-cigarettes, which typically contain nicotine, flavoring, and a humectant (e.g., propylene glycol) to produce the aerosol. However, in addition to nicotine, ENDS aerosols can contain other harmful and potentially harmful constituents, including heavy metals, ultrafine particulate, and volatile organic compounds (Goniewicz et al., 2014). Several different types of ENDS are currently available on the U.S. market, including those that are disposable, those that use cartridges, and “tank” systems or “mods” (Grana et al., 2014). In May 2016, the U.S. Food and Drug Administration (FDA) issued a

rule to deem all products made or derived from tobacco—including ENDS, dissolvables, and novel and future products—subject to FDA jurisdiction (Food and Drug Administration, 2016).

Prevalence of e-cigarette use among U.S. youth and adults has increased rapidly in recent years. From 2011 to 2014, past 30-day use of e-cigarettes increased from 1.5% to 13.4% among high school students and from 0.6% to 3.9% among middle school students (Arrazola et al., 2015). During 2010–2013, past 30-day use increased from 1.0% to 2.6% among adults (King et al., 2015); past 30-day ENDS use was 4.8% in 2014 (Caraballo et al., 2015). In 2012/2013, 76.8% of past 30-day adult e-cigarette users were current smokers (King et al., 2015). However, despite the increasing prevalence of use, there is limited evidence on the general safety and long-term public health impact of e-cigarettes, especially with regard to their efficacy as a method for quitting conventional cigarette smoking and the potential for their use to lead to subsequent initiation of conventional tobacco product use among youth and young adults (Leventhal et al., 2015; Primack et al., 2015).

Given this limited evidence and the fact that e-cigarettes are still relatively new in the U.S. marketplace, reasons for e-cigarette use are not yet well understood. A few prior studies that have examined reasons for use have done so only among certain subpopulations. Among pregnant women who had ever used e-cigarettes, the most common reasons

Abbreviations: aPR, adjusted prevalence ratio; ENDS, electronic nicotine delivery system; FDA, Food and Drug Administration; IRB, institutional review board; NATS, National Adult Tobacco Survey.

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for use were the perception of less harm than traditional cigarettes (74%) and help with smoking cessation (72%) (Mark et al., 2015). Among opioid-dependent cigarette smokers in a clinical setting, the most common reasons for last e-cigarette use were curiosity (41.4%), followed by wanting to quit all nicotine (26%) (Stein et al., 2015); whereas almost half endorsed quitting or reducing cigarette smoking and 32% endorsed curiosity/experimentation as reasons for use among ever e-cigarette users in an outpatient substance use treatment program (Peters et al., 2015). From the 2013 Montana Adult Tobacco Survey, Schmidt et al. (2014) found that the most common reasons cited by ever e-cigarette users were “trying something new” (64%) or “trying to quit or reduce cigarette use” (56%) (Schmidt et al., 2014). Of the studies that examined broader U.S. adult populations, one assessed potential reasons to switch to ENDS among cigarette smokers only and found more interest in using e-cigarettes for cessation-related reasons (i.e., to reduce health risk, to cut down on the number of cigarettes, and to quit smoking) (Berg et al., 2015). Two additional studies have assessed reasons among smokers and nonsmokers; Zhu et al. (2013) found that reasons related to curiosity (68.3%) and cessation (54.9%) were most commonly reported. In the study by Pepper et al. (2014), the most common reasons stated were curiosity (53%); because a friend or family member used, gave, or offered e-cigarettes (34%); and quitting or reducing smoking (30%) (Pepper et al., 2014). However, these studies assessed reasons among ever e-cigarette users; thus, it was not possible to disaggregate reasons for use between one-time experimenters and more frequent users (Zhu et al., 2013; Pepper et al., 2014).

Understanding the reasons for use in a large population study, including by sociodemographic and product characteristics, among current e-cigarette users could help inform public health policy, planning, and practice. To address this gap in the scientific literature, this study assessed reasons for current e-cigarette use among current e-cigarette users drawn from a national online sample of U.S. adults by sociodemographic characteristics, cigarette smoking status, and e-cigarette product characteristics.

2. Methods

2.1. Data and sample

Data came from Internet surveys of U.S. adult conventional cigarette smokers and nonsmokers that were designed to be nationally representative of each of these separate populations. Survey participants were recruited from a probability-based sample of residential mailing addresses derived from the U.S. Postal Services Delivery Sequence File. Sampled households received survey invitation letters containing a website link and survey password. Interested participants completed a brief screening instrument to determine their study eligibility.

All surveys were administered online by GfK Custom Research, which recruits custom probability-based samples for online surveys. Participants who did not already have Internet access when recruited were provided additional study incentive payments to obtain public Internet access, such as library locations or other points of access outside their homes. On the basis of these recruitment procedures, participants could not volunteer for study enrollment, and all sampled households had a known probability of selection. Recruitment procedures followed the methods used in GfK's KnowledgePanel (Chang and Krosnick, 2009; Yeager et al., 2011). All survey protocols and recruitment procedures were reviewed and approved by the sanctioned institutional review board (IRB) of RTI International.

Data collection was conducted from April 12 to June 30, 2014. All data were analyzed from July 2014 to March 2016. The sample consisted of 10,181 current cigarette smokers and 3123 nonsmokers aged 18 or older. The overall sample response rate was 22.8% among all invited households. Current cigarette smokers were defined as persons who had smoked at least 100 conventional cigarettes in their lifetime and currently smoked either “some days” or “every day” at the time of the

survey. Nonsmokers were defined as persons who reported smoking “not at all” at the time of the survey, regardless of lifetime number of conventional cigarettes smoked.

2.2. Measures

2.2.1. Current E-cigarette use

Current e-cigarette users were defined as those who responded “every day” or “some days” to the question, “Do you now use e-cigarettes every day, some days, or not at all?”

2.2.2. Reasons for E-cigarette use

Current e-cigarette users were asked to indicate their reasons for use by the question, “Are any of the following a reason why you currently use electronic cigarettes/e-cigarettes?” Respondents could select multiple choices from 14 responses, which included reasons such as cost, flavors, consideration of others, and use as a cigarette cessation aid, among others (Table 1). Previous research has developed and refined the reasons constructs we used through in-person cognitive testing and online item pretesting (Pepper et al., 2014). These responses were presented in random order to survey participants. On the basis of item correlation analysis, the reasons for e-cigarette use were then grouped into categories. The categories cited by at least 25% of current e-cigarette users were included in this analysis: cigarette cessation and health (“cessation/health”), consideration of others, convenience of e-cigarettes (“convenience”), cost, curiosity, flavors, and simulation of conventional cigarettes (“simulation of cigarettes”). Advertising was cited by less than 25% of current e-cigarette users; due to sample size limitations, it was excluded from the analysis.

2.2.3. Respondent characteristics

Characteristics that were assessed included age (18–24, 25–34, 35–54, ≥55 years), sex (male or female), race/ethnicity (non-Hispanic white, non-Hispanic African American, Hispanic, or other), educational attainment (less than high school, high school graduate, some college, or college graduate or higher), household income (<\$20,000, \$20,000–\$49,999, \$50,000–\$99,999, or ≥\$100,000), U.S. Census region (Northeast, Midwest, South, or West), presence of children younger than 18 years of age in the household (yes or no), conventional cigarette smoking (current smoker or nonsmoker), and cigarettes smoked per day (0, 1–10, 11–19, or ≥20). Respondents were also asked about type of e-cigarette product used by the question, “Do you usually use disposable electronic cigarettes/e-cigarettes, an electronic cigarette/e-cigarette that uses cartridges, or an electronic cigarette/e-cigarette that uses tanks?” The device types were presented in random order across respondent surveys.

2.3. Analysis

The final analytic sample was restricted to the 2448 respondents who reported current e-cigarette use (2295 cigarette smokers and 153 nonsmokers). Descriptive statistics were used to calculate reasons for e-cigarette use among current e-cigarette users, both overall and by sociodemographic characteristics, cigarettes smoking status, and e-cigarette product type. Wald tests were used to assess statistically significant ($P < 0.05$) differences across respondent characteristics.

Multivariate Poisson regressions were used to assess the relationship between each reason for using e-cigarettes and respondent characteristics ($P < 0.05$) among current e-cigarette users; a separate regression model for each reason category was performed. Poisson regressions were used because of the high prevalence for many of the study outcomes. All regression coefficients were converted to prevalence ratios for ease of interpretation. These models controlled for the aforementioned respondent characteristics, with the exception of cigarettes smoked per day because of its collinearity with current cigarette smoking status.

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