



Reasons for electronic cigarette use beyond cigarette smoking cessation: A concept mapping approach



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HIGHLIGHTS

- Electronic cigarette users report using electronic cigarettes for many reasons.
- Smoking cessation is one of many reported reasons for electronic cigarette use.
- User characteristics were associated with different rating of reasons for use.

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ABSTRACT

Introduction: Electronic cigarettes (ECIGs) continue to grow in popularity, however, limited research has examined reasons for ECIG use.

Methods: This study used an integrated, mixed-method participatory research approach called concept mapping (CM) to characterize and describe adults' reasons for using ECIGs. A total of 108 adults completed a multi-module online CM study that consisted of brainstorming statements about their reasons for ECIG use, sorting each statement into conceptually similar categories, and then rating each statement based on whether it represented a reason why they have used an ECIG in the past month.

Results: Participants brainstormed a total of 125 unique statements related to their reasons for ECIG use. Multi-variate analyses generated a map revealing 11, interrelated components or domains that characterized their reasons for use. Importantly, reasons related to Cessation Methods, Perceived Health Benefits, Private Regard, Convenience and Conscientiousness were rated significantly higher than other categories/types of reasons related to ECIG use ($p < .05$). There also were significant model differences in participants' endorsement of reasons based on their demography and ECIG behaviors.

Conclusions: This study shows that ECIG users are motivated to use ECIGs for many reasons. ECIG regulations should address these reasons for ECIG use in addition to smoking cessation.

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1. Introduction

Tobacco use accounts for nearly 500,000 annual deaths in the US (U. S. Department of Health and Human Services, 2014). Cigarette smoking rates are at an all-time low, however, nearly one fifth of American adults smoke (U. S. Department of Health and Human Services, 2014). Nicotine replacement therapy (NRT) is commonly used to help smokers quit, but smoking abstinence rates associated with nicotine patches, nicotine gum, or other pharmaceuticals range from 0.6% to 35.5% (Bauld,

Chesterman, Ferguson, & Judge, 2009; Bock, Hudmon, Christian, Graham, & Bock, 2010; Costello et al., 2011; Davidson et al., 1998; Dent, Harris, & Noonan, 2009; Hays, Croghan, Schroeder, et al., 1999; Leischow et al., 1999; Maguire, McElnay, & Drummond, 2001; Shiffman, Gorsline, & Gorodetzky, 2002; Shiffman, Rolf, Gorsline, et al., 2002; Sonderskov, Olsen, Sabroe, Meillier, & Overvad, 1997; Vial, Jones, Ruffin, & Gilbert, 2002). The challenges associated with smoking cessation may lead some smokers to explore other options as a means to quit smoking.

One option may be electronic cigarettes (ECIGs). ECIGs are devices that use an electrically-powered heating element to heat a liquid solution so that an aerosol is produced for the user to inhale. ECIGs typically contain a liquid with varying concentrations of nicotine, propylene glycol, vegetable glycerin, and flavorants. ECIG products vary considerably

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with some products storing the liquid in prefilled disposable cartridges, refillable tanks, or others that do not use a liquid storage device, but rather users “drip” liquid directly onto the ECIG heating element for inhalation. Though not approved by the FDA as smoking cessation aids, some tobacco cigarette smokers have used ECIGs in attempts to quit or reduce cigarette smoking (Ayers, Ribisl, & Brownstein, 2011; Biener & Hargraves, 2015; Brose, Hitchman, Brown, West, & McNeill, 2015; Etter, 2010; Etter & Bullen, 2011; Hitchman, Brose, Brown, Robson, & McNeill, 2015; McQueen, Tower, & Sumner, 2011; Polosa et al., 2011). Some may perceive that ECIGs are more efficacious for smoking cessation, more desirable, have fewer negative side effects, and are more effective at preventing relapse than NRT products (Barbeau, Burda, & Siegel, 2013). Smoking cessation may represent a major reason for initiation of ECIG use.

Little research has examined the broad range of reasons for ECIG use. Most studies that have examined reasons for ECIG use among adults report smoking cessation as a common reason for ECIG use (Adikson, O'Connor, Bansal-Travers, et al., 2013; Berg, Haardoerfer, Escoffery, Zheng, & Kegler, 2015; Brown et al., 2014; Goniewicz, Lingas, & Hajek, 2013; Hummel, Hoving, Nagelhout, et al., 2015; Kadimpati, Nolan, & Warner, 2015; Kralikova, Novak, West, Kmetova, & Hajek, 2013; Mark, Farquhar, Chisolm, Coleman-Cowger, & Terplan, 2015; Pepper & Brewer, 2013; Peters, Harrell, Hendricks, et al., 2015; Pepper, Ribisl, Emery, & Brewer, 2014; Richardson, Pearson, Xiao, Stalgaitis, & Vallone, 2014). While marketing efforts promote ECIGs for smoking cessation (Huang, Kornfield, Szczypka, & Emery, 2014), some individuals may initiate and maintain ECIG use for other purposes. Studies have reported increases in ECIG use among youth and adults who have never used any tobacco product (Bunnell, Agaku, Arrozola, et al., 2014; McMillen, Gottlieb, Shaefer, Winickoff, & Klein, 2014). Given that some ECIG users have never used tobacco before, it can be assumed that there are other reasons for using ECIGs beyond smoking cessation. Additionally, even though many ECIG users who are current or former tobacco users identify smoking cessation as a reason for ECIG use, there are likely other reasons for ECIG use especially considering the differences between conventional cigarettes and ECIGs (e.g., social acceptability, product characteristics, availability of flavors, perceived health benefits, etc.). A greater understanding of the reasons for ECIG use will provide valuable perspective that can inform policies and regulations addressing ECIG use. Understanding reasons for ECIG use may allow for the development of policies that decrease the appeal of ECIGs among youth or would-be never tobacco users.

1.1. Current study

The purpose of this study was to conceptualize the broad range of reasons for ECIG use among adults. The study used concept mapping (CM) (Kane & Trochim, 2007; Trochim, 1989) to characterize, describe, and explain reasons for ECIG use. CM is a mixed-method, participatory research approach that combines qualitative and quantitative research methods. We additionally sought to determine which reasons for ECIG use were perceived to be the most important among ECIG users and whether reasons varied by age, gender, and frequency of ECIG use.

2. Method

2.1. Overview

CM was used to characterize and describe factors related to adults' reasons for using ECIGs. CM involves six steps: (1) preparation, (2) generation (i.e., brainstorming), (3) structuring (i.e., sorting and rating), (4) data analysis and representation, (5) interpretation, and (6) utilization. Each step is described below.

2.2. Participant recruitment

We employed a two-stage participant recruitment strategy. The first recruitment stage involved the enlistment of ECIG users from national and regional ECIG user conferences and conventions to participate in online studies about their attitudes, beliefs, and perceptions related to ECIGs. With approval from conference/convention organizers, a study registration booth was set up in these venues. Conference attendees who visited the booth were shown recruitment cards that provided a description of the study and an email address and phone number to inquire about study procedures. Conference attendees were also given 5–10 recruitment cards to distribute to others. Overall, approximately 700 recruitment cards were disseminated across three conferences/conventions held in Washington, DC and Las Vegas, NV. Prospective study participants completed an online screening survey to determine eligibility. Individuals who were over the age of 18 and reported ECIG use in the past month were considered eligible to participate. The screening survey also collected contact, demographic, and past 30-day ECIG use information. Eligible individuals who contacted study personnel via email were provided a link to a screening survey.

2.3. Preparation, generation and structuring

In the preparation step, the investigators developed, pretested, and revised a focus prompt based on information gathered through computerized structured interviews with 20 ECIG users. Specifically, 20 ECIG users over the age of 18 who responded to posted advertisements provided responses to an initial focus prompt related to reasons for ECIG use. These pilot participants then provided feedback through 15–20 min structured interviews to make the prompt easier to understand. In these free-text interviews, participants indicated if they understood the prompt and if they would change anything in the prompt. This pilot testing resulted in the final focus prompt: “A specific reason why I have used ECIGs in the past month is...”. Following the focus prompt refinement, research personnel invited the 287 screened individuals who met eligibility criteria to enroll in the study (over the age of 18 and ECIG use in the past 30 days). Of the 287, 108 enrolled in the IRB-approved, online study. Using online CM software (Concept System® Global MAX™), invited participants selected tasks from three, integrated online modules: brainstorming ($n = 76$), sorting ($n = 31$), and rating ($n = 65$). Participants first completed the brainstorming task and later completed the sorting and rating tasks at a second time point. Participants who completed the brainstorming task were invited to complete the sorting and rating tasks as well as others who did not complete the brainstorming task. During screening, participants provided demographic information (age, race, ethnicity, sex) and then answered questions related to their ECIG and tobacco use prior to completing the online CM tasks.

Generation involved participants responding to the finalized focus prompt during an asynchronous, online brainstorming session. For brainstorming, participants typed statements that completed the focus prompt. Each participant was asked to add five to eight statements. Collected statements were saved and, in real time, added to the list of statements, where all participants could view them. Participants completed this task individually, however, once statements were submitted by a participant, participants who completed the brainstorming task afterwards were able to see the previously submitted statements. Participants were instructed to review the previously submitted statements before submitting their own statements to reduce the likelihood of submitting redundant statements. Upon completion of the brainstorming session, researchers synthesized the list using a four-step review process: deleting irrelevant or nonsensical responses (e.g., I now earn \$1000/day while not leaving my house), eliminating duplicative responses, and consolidating and revising responses. Through this systematic process, the initial list of 482 brainstormed statements was reduced to 125 representative statements.

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