Formative research to identify perceptions of e-cigarettes in college students: Implications for future health communication campaigns

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Abstract

Objective—This formative study examined perceptions of e-cigarettes in college students with the goal of informing future health communication campaigns. Differences between e-cigarette users and nonusers were also examined. Participants: Thirty undergraduate students were recruited from a large southwestern public university (15 users, 15 nonusers).

Methods—Structured interviews were conducted and transcripts were coded for themes.

Results—Although users had more favorable attitudes toward e-cigarettes, both users and nonusers believed that e-cigarettes produce water vapor and reported that e-cigarettes were less harmful than conventional cigarettes. Potential health consequences and addiction concerns were the most common perceived threats for both users and nonusers. Both nonusers and users cited social stigma as a perceived disadvantage of e-cigarette use.

Conclusions—Ultimately, themes with particular relevance to future health communication campaigns included negative perceptions of e-cigarette users and social stigma, as well as harm perceptions and potential health consequences associated with e-cigarette use.

Electronic cigarettes ("e-cigarettes") are battery-powered delivery systems that provide nicotine through a liquid solution ("e-liquid") usually consisting of propylene glycol and flavorings. Although e-cigarettes are a relatively new phenomenon, first introduced in the US market in 2007, their use in young adults has increased rapidly. Results from recent nationally representative studies of e-cigarette use in adults in the United States indicate that lifetime, or ever use, of e-cigarettes is approximately 10% among 18- to 24-year-olds, although the exact prevalence varies by study. Additionally, e-cigarette use among adults is increasing and is more prevalent among younger adults than older adults.

The increase in prevalence of use of e-cigarettes in young adults is particularly concerning given the fact that e-cigarettes contain many potentially harmful chemicals, and the long-term health risks are unknown. Furthermore, e-cigarettes are not currently regulated by the Food and Drug Administration and therefore are not subject to marketing restrictions like conventional cigarettes. As a result of the lack of marketing restrictions, e-cigarette companies are currently advertising their products on television, radio, and the Internet. In a recent article, researchers found that exposure to e-cigarette television advertising among US young adults aged 18 to 24 more than tripled between 2011 and 2013. E-cigarette companies also advertise on social media Web sites such as Facebook and Twitter, which have a large number of young adult users. In addition to social marketing campaigns, e-cigarette promotions are also present at popular music festivals frequented by college students, including Bonnaroo and South by Southwest. The heavy promotion of e-cigarettes is likely to increase the prevalence of e-cigarette use in young adults, as previous research indicates that advertising of tobacco products is causally associated with tobacco use in youth and young adults.

Although the literature regarding beliefs about e-cigarettes in young adults is still developing, several themes have emerged, including perceptions that e-cigarettes are less harmful than conventional cigarettes, incorrect assumptions about the contents of e-cigarettes, the use of e-cigarettes as tools to quit conventional cigarettes, among others. Sanders-Jackson and colleagues assessed knowledge of the contents of e-cigarettes, specifically whether e-cigarettes contain potentially harmful chemicals and nicotine. Results from the study indicate that there is a large degree of uncertainty and misinformation regarding e-cigarette constituents in young adults, with 37% stating that they didn't know whether some e-cigarettes contain nicotine, and 48% stating that they did not know whether e-cigarettes contain any harmful chemicals. Furthermore, in a survey of young adults aged 20 to 28, Choi and Forster found that participants who viewed e-cigarettes as useful aids in quitting conventional smoking and those who had lower harm perceptions of e-cigarettes had significantly higher odds of ever using e-cigarettes. In research specific to college students, Saddleson et al. found that participants with lower harm perceptions of e-cigarettes were more likely to report ever and current use of e-cigarettes compared with participants with higher harm perceptions.

Study purpose and theoretical rationale

Although previous research has examined knowledge and harm perceptions regarding e-cigarette use in young adults,‒ research examining other theoretical constructs that have been associated with health behaviors is lacking. The purpose of this formative qualitative study was to examine relevant theoretical constructs (eg, knowledge, attitudes, perceived benefits/advantages, perceived threat/disadvantages, perceived barriers, perceived norms, and perceived self-efficacy) with respect to e-cigarette use in college students in order to inform future health communication campaigns. Differences in perceptions among e-cigarette users and nonusers were also examined.

Integrated framework

An integrated theoretical framework was used to investigate salient factors associated with e-cigarette use behaviors among college students (see Figure 1). The Health Belief Model‒ (HBM) is a conceptual framework that has been applied to a wide variety of health behaviors and is one of the most utilized theories in the field of health communication. The HBM conceptualizes engagement in health behaviors as the result of modifying factors and individual beliefs, including perceived susceptibility and severity, perceived benefits, perceived barriers, and perceived self-efficacy to engage in a particular behavior. Specifically for tobacco use, the HBM has been used to better understand perceptions of health risks, youths' perceptions of addiction, behavior to avoid exposure to environmental tobacco smoke, and hookah smoking among young adults.‒ Similarly, the Theory of Planned Behavior (TPB) is also a useful framework to understand factors associated with college students' intention and use of e-cigarettes. TPB is an extension of the theory of reasoned action and describes the influences on a person's decision to engage in a behavior· and has been used to study tobacco use among young adults. Determinants of behavior include behavioral intentions, attitudes, perceived norms, and perceived behavioral control.· Given that many of the constructs of TPB and HBM overlap, a unified framework was created to encorporate salient factors associated with e-cigarette use in college students. For example, the TPB constructs of attitudes and perceived norms were added to the HBM model under the component of individual beliefs. In addition, given the similarity between the constructs of perceived behavioral control and self-efficacy, only one construct (self-efficacy) was retained in the unified model.

Methods

Participants and procedures

Thirty undergraduate students were recruited from the participant pools from a large southwestern university, as well as through online recruitment from a university-wide event calendar. The participant pool consisted of students enrolled in communication studies or advertising and public relations courses who agreed to participate in research studies in exchange for extra credit or monetary compensation. To be eligible, participants had to be currently enrolled as undergraduate students and be between the ages of 18 and 26; in addition, we sought to enroll equal numbers of e-cigarette users and nonusers. E-cigarette use was determined with responses to the question "Have you ever used an e-cigarette?"

Participants who answered "yes" were classified as e-cigarette users; those who answered "no" were classified as nonusers. Upon completion of the study, participants were given a $20 gift card for their participation.

This study was reviewed and approved by the University of Texas School of Public Health Committee for the Protection of Human Subjects. Informed consent was obtained prior to participation in the study; individuals who participated in person were provided consent forms and asked to sign if they agreed to participate. Individuals who participated via phone were read the consent form and verbal consent was obtained.

Data collection and analysis

Structured interviews were conducted from August 2014 to March 2015. An interview guide was developed using constructs from the Health Belief Model and the Theory of Planned Behavior (see Table 1). The guide included constructs from the 2 theories, including knowledge, attitudes, perceived benefits/perceived advantages, perceived threats/perceived disadvantages, perceived barriers, perceived norms, and perceived self-efficacy.

In addition, participants completed a short questionnaire on demographic information and use of conventional cigarettes prior to the structured interviews. Interviews were conducted in person or via telephone. All interviews were audio recorded and transcribed verbatim. Transcripts were coded for themes in Nvivo 10 using a thematic analysis framework. The primary author (KC) was responsible for conducting all of the structured interviews and the coding of the data. The use of one individual to conduct both the interviews and coding increased the likelihood that the meaning of the interviews was effectively captured in the coding process. Interview transcripts were analyzed using deductive coding processes to identify and label HBM and TPB themes related to e-cigarette use in college students as described in the text transcripts. Following the initial coding of the data, an inductive coding process was used to identify common subthemes and codes were reexamined to determine which codes were most consistent or frequent across the data, as well as to group similar codes into larger themes. A cross-sectional code and retrieve method was utilized for analysis, which involved creating codes from an initial reading of the data and applying these codes across the full sample. Participants are identified in the results section according to gender and e-cigarette use (ever e-cigarette user, nonuser).

Results

Consistent with the standards of elicitation interviews, our final sample consisted of 15 nonusers and 15 e-cigarette users between the ages of 18 and 25 ($M = 20.6$), with 16 females and 14 males. Forty percent of participants were white, non-Hispanic, 17% were Hispanic, 30% were Asian, and 13% indicated that they were another race. Of the participants who reported using e-cigarettes, only 3 (20%) reported current e-cigarette use (using in the past 30 days). With respect to conventional cigarette use, most nonusers reported not having tried conventional cigarettes ($n = 11$, 73%), whereas the majority of e-cigarette users reported using conventional cigarettes at least once ($n = 12$, 80%). Based on the constructs generated from the Health Belief Model and the Theory of Planned Behavior, we created 7 overarching themes: knowledge, attitudes, perceived benefits/perceived advantages, perceived threat/

perceived disadvantages, perceived barriers, perceived norms, and perceived self-efficacy. For each of the 7 overarching themes, subthemes were created to capture the most common responses. Results were also examined by e-cigarette use status to determine if there were differences in perceptions among e-cigarette users and nonusers.

Knowledge of e-cigarettes

Overall, participants reported being unsure of the definition and contents of an e-cigarette; specifically, if e-cigarettes contained nicotine and/or tobacco. More nonusers reported being unsure of the definition of e-cigarettes than e-cigarettes users; however, some e-cigarette users reported confusion as to whether e-cigarettes contained nicotine: "I don't know because the black tube I was telling you about, I don't know if that's an e-cig … I didn't even know if there was any nicotine in it" (*female, e-cigarette user, no. 1*). Participants also expressed uncertainty about how e-cigarettes work: "To my knowledge, it's liquid tobacco that's vaporized. I don't know a lot about them. I think that's how the process works" (*male, nonuser, no. 1*). Furthermore, a common misperception identified through the interviews was that the aerosol produced by e-cigarettes was water vapor:

> An e-cigarette is an electronic cigarette that takes the water vapor from the air and filters it through nicotine and flavoring and releases it back into the air. It's like pseudo-smoking to give you the feeling of smoking but in reality you're not inhaling any smoke (*male, e-cigarette user, no. 1*).

This belief was echoed by nonusers as well, for example: "[E-cigarettes are] something that you can vape with, it uses liquid instead of conventional tobacco. It's like water vapor that you're smoking and it comes out like steam" (*female, nonuser, no. 2*). Another nonuser stated a similar belief: "[An e-cigarette] is not actually a cigarette; it uses water vapor and sometimes nicotine in an electronic device that you inhale through your lungs and breathe out" (*female, nonuser, no. 3*).

Most participants were unable to identify a brand of e-cigarettes, although more e-cigarette users were able to name a brand compared with nonusers. Among the nonusers, Blu was the only brand named; among e-cigarette users, Blu was the most frequent brand identified, followed by Vuse and other smaller brands. Overall, more nonusers reported not seeing any e-cigarette advertisements than ever e-cigarette users. Among e-cigarette users, the most commonly cited medium for viewing e-cigarette advertisements was at the point of sale, followed by television and magazines. Finally, with respect to other names for e-cigarettes, most nonusers could not list any other names; however, among those who did list other names, "vapes" (vaper, vaporizer) was most common, followed by "e-cigs." For e-cigarette users, the most common names included "vapes" (vapers, vaporizers), followed by "e-hookah" (hookah pen, hookah sticks).

Individual beliefs

Attitudes—Attitudes toward the use of e-cigarettes by college students were mixed and fell into 3 different categories: positive, negative, and neutral. With respect to differences by e-cigarette use category, more e-cigarette users reported having positive attitudes toward e-cigarette use compared with nonusers. Many participants who reported positive attitudes

toward e-cigarettes cited the belief that they are healthier and less harmful than conventional cigarettes:

> I think it's a lot better alternative to conventional cigarettes. I'd rather them [college students] use an e-cigarette than conventional [cigarettes], so I have a negative view towards conventional but positive towards e-cigarettes because they are making a healthier choice (*male, e-cigarette user, no. 2*).

Another e-cigarette user echoed this statement and stated that he had a positive attitude towards e-cigarettes due to the belief that e-cigarettes produce less abrasive smoke than conventional cigarettes,

> In public, especially, it's like, thanks for not using [conventional] cigarettes because my mom hate that smell and I'm not keen on it; I'll just move away but she'll get really mad. It's a "thank you" in public for not using a cigarette on the street (*male, e-cigarette user no. 3*).

Conversely, more nonusers reported having negative or neutral attitudes toward use of e-cigarettes in college students than ever users: "I don't have a positive opinion on it, to be honest. I think on campus, any type of smoking, you shouldn't do it on campus" (*female, nonuser, no. 1*). Another participant cited health concerns as the reason for her negative attitudes toward e-cigarettes:

> I don't think it [e-cigarette smoking] should be on campus; it [e-cigarette] still contains chemicals that are harmful to the individual and others around them and if we are a healthy campus, and a lot of people are fit and active, it doesn't look good to have people smoking on campus (*female, nonuser, no. 4*).

Some participants who reported neutral attitudes toward e-cigarette use in college students reported concerns about potential negative health effects but also beliefs that e-cigarettes may be used as cessation aids for quitting conventional cigarette use: "My opinion is, I wonder if they are trying to quit smoking traditional cigarettes, if they are, I wish them good luck. Otherwise, I don't have much of an opinion" (*female, nonuser, no. 3*). An e-cigarette user stated concerns about the health consequences of e-cigarettes: "Not really [have opinion about college students using e-cigarettes]. Only thing that really goes through my mind is 'are they really healthy?'" (*male, e-cigarette user, no. 4*).

Perceived benefits/advantages—For both nonusers and e-cigarette users, the most commonly cited themes with respect to perceived benefits/advantages of e-cigarettes were perceptions that e-cigarettes are less harmful than conventional cigarettes and that they can be used as cessation aids to quit conventional cigarettes. When further exploring the reasons for the belief that e-cigarettes are less harmful than conventional cigarettes, several themes emerged, including fewer chemicals, less nicotine, and less smoke than conventional cigarettes. With respect to fewer chemicals, most individuals talked about their perceptions of e-cigarettes versus conventional cigarettes: "I think they are less harmful because they have less chemicals than traditional [cigarettes]" (*female, nonuser, no. 1*). Furthermore, a male e-cigarette user echoed those beliefs: "There's no harm on your teeth, there's no, well, there's very, very, very less carcinogens, just about the same carcinogens that you would get

from breathing air" (*male, e-cigarette user, no. 2*). Similarly, many participants viewed e-cigarettes as containing less nicotine than conventional cigarettes: "I would say less [harmful than conventional cigarettes]. For example, some might just have flavor or like a lower amount of nicotine" (*female, e-cigarette user, no. 2*). With respect to smoke, participants stated beliefs that the smoke e-cigarettes produce is less harmful to both the user ("They are less harmful because I believe that there is less smoke going into your lungs" [*female, e-cigarette user, no. 3*]) and those around them ("To my knowledge, when people exhale whatever vapor it doesn't actually give anyone the risk of secondhand smoking" [*female, e-cigarette user, no. 4*]).

Participants also expressed the view that e-cigarettes may be used as cessation tools to help conventional cigarette smokers quit smoking: "I did recently see a study that they [e-cigarettes] were helpful in helping people quit cigarettes, and I think anything to help people quit is good" (*female, nonuser, no. 1*). This view was echoed by an e-cigarette user who stated that e-cigarettes helped wean her off conventional cigarettes for a time:

> I used it [an e-cigarette] to quit regular cigarettes, I was able to quit pretty much immediately. Then I stopped using e-cigarettes for like a year, and I wasn't using either, wasn't smoking at all. Then I started smoking again and using e-cigarettes again, so I'm not sure if it's a forever thing, but it helped me quit for a time period (*female, e-cigarette user, no. 5*).

Another e-cigarette user supported this comment and stated that e-cigarettes are a useful way of quitting conventional cigarettes because you can choose the amount of nicotine in the e-liquid: "I know part of the advantage of e-cigarettes, and why people use them for quitting cigarettes is that you can control the amount of nicotine that is delivered to you, so it's a self-delivery system" (*male, e-cigarette user, no. 4*).

Perceived threat/perceived disadvantages—Participants noted several perceived threats/disadvantages of e-cigarette use, including potential health consequences of use, addiction, cost of use, and social stigma. Both nonusers and e-cigarette users reported similar themes, with the exception of cost of use, which was a common theme for e-cigarette users but not for nonusers. With respect to potential health consequences of e-cigarette use, participants cited concerns about the chemicals in e-cigarettes ("Even though they say that the tobacco is not as much [as in conventional cigarettes], they could have other substances that you don't know about" [*female, nonuser, no. 4*]) and lack of knowledge by the public ("I think they [e-cigarettes] are more harmful because the public doesn't view it as serious as an actual cigarette … I think they [e-cigarettes and conventional cigarettes] have the same issues but people don't register it because it's electronic" [*male, e-cigarette user, no. 3*]).

Many participants noted that since electronic cigarettes often contain nicotine, the potential for addiction is similar to that of conventional cigarettes: "I guess a disadvantage is that you are still addicted to nicotine. You are still smoking a cigarette" (*female, e-cigarette user, no. 3*). Cost of use was cited as a disadvantage primarily by e-cigarette users, who perceived that the cost of e-cigarettes was higher than that of conventional cigarettes: "I think they are more expensive [than conventional cigarettes]" (*female, e-cigarette user, no. 6*); and "It's definitely a waste of your money, I think that's a big thing" (*male, e-cigarette user, no. 5*). In

addition, social stigma was mentioned as a potential disadvantage of e-cigarettes because people may perceive e-cigarette users as addicts: "They automatically think that you have some sort of problem, like you are so addicted that you are having to use it" (*female, nonuser, no. 3*). In addition, other participants expressed the belief that e-cigarette users have negative personality characteristics, for example: "Being a tool, for one [is a disadvantage]. A tool is somebody who is trying to be what they are not, trying to act cool … that's what I perceive when I see someone doing it [using an e-cigarette]" (*male, ever user no. 2*). A male nonuser also stated that e-cigarettes use is associated with negative personality characteristics: "You look like a bit of a dork, to be honest. They don't have a particularly positive stereotype surrounding them" (*male, nonuser, no. 2*).

Perceived norms—Differences in themes related to perceived norms between e-cigarette users and nonusers were noted. Most nonusers reported that no one they knew, friends or family, would approve of their use of e-cigarettes: "I think my friends and family would disapprove of my use [of e-cigarettes] because there's not a lot of research on them so they could still be potentially harmful" (*female, nonuser, no. 3*). However, the second most common response for nonusers was that their peers would support their use of e-cigarettes: "I think my friends [would approve]. It's not illegal and it's not harmful necessarily, it's just like another thing" (*male, nonuser, no. 3*). For e-cigarette users, most perceived that their peers would approve of their use of e-cigarettes: "Peers, definitely [would approve of e-cigarette use]. It's socially acceptable, it's just, as a group, it's you know, 'oh hey, smoking on the hookah pen'" (*male, e-cigarette user, no. 2*). Additionally, a common theme with e-cigarette users was the perception that their family would prefer them to use e-cigarettes as opposed to conventional cigarettes: "My mother [would approve of e-cigarette use]. She would rather me use an e-cigarette than conventional cigarettes, that's for sure. People that care about me would rather me smoke an e-cig than smoke conventional cigarettes" (*female, e-cigarette user, no. 4*). Another e-cigarette user echoed this comment, stating:

> I guess family members [would support e-cigarette use] because my family has a long line of smoking [conventional] cigarettes; if they were to see that e-cigarettes were healthier and not damage their furniture on Christmas, they would be more approving [of e-cigarette use] (*male, e-cigarette user, no. 2*).

Perceived self-efficacy—Both e-cigarette users and nonusers reported high perceived self-efficacy to use and obtain e-cigarettes; furthermore, 2 common themes emerged with respect to perceived self-efficacy: accessibility of e-cigarettes and ease of use. As noted by several participants, e-cigarettes are sold in a variety of different stores from gas stations to smoke shops, thus making them easily accessible to college students: "I'm sure I would know how to use one [e-cigarettes]. I think they are easily accessible to college students" (*female, e-cigarette user, no. 7*); "I've seen them [e-cigarettes] at Walmart, and [I'm] pretty sure you can buy them at gas stations too" (*male, nonuser, no. 4*). Furthermore, ease of use was also mentioned as a reason for individuals being certain they could use e-cigarettes, for example, one e-cigarette user stated:

> Pretty positive [I could use an e-cigarette], definitely the bigger pens, not the disposable [e-cigarettes]. I'm guessing the disposable ones, I'm not sure if there's a

button or anything, but I know the bigger pens, you just click the button (*male, e-cigarette user, no. 5*).

Perceived barriers—With respect to perceived barriers to e-cigarette use, several different themes emerged for e-cigarette users and nonusers; for e-cigarette users, the most common themes were cost of use, concerns about potential addiction, and perceived social stigma. With respect to cost of use, several e-cigarette users perceived e-cigarettes as expensive, for example: "I definitely don't have the resource to probably get that [e-cigarettes]. I'm trying to save every dollar I can, and it's not going to go to buying e-cigarettes, I have better things to do" (*female, e-cigarette user, no. 1*). Other e-cigarette users cited concerns about potential addiction as a barrier to use: "The barriers I'm thinking of are for myself, like not allowing myself to start that [e-cigarettes] as some kind of habit. It does have negative side effects like regular cigarettes and I do not want to get addicted" (*female, e-cigarette user, no. 8*). Social stigma was also another barrier to use among e-cigarette users: "A couple of my friends aren't very fond of e-cigarettes either, so it's like a social barrier, who I can and can't smoke around" (*male, e-cigarette user, no. 4*).

Conversely, nonusers listed lack of information about e-cigarettes ("They [e-cigarettes] seem to be overwhelming because there are so many parts and different brands" [*female, nonuser, no. 3*]) and age restrictions for purchasing e-cigarettes ("I know there are age restrictions for buying e-cigarettes. I know you have to be 18" [*male, nonuser, no. 4*]) as common barriers.

Comment

The current study expands on previous research that has examined predictors of e-cigarette use among college students by assessing numerous theoretical constructs from the Health Belief Model and the Theory of Planned Behavior. Although there were numerous emergent themes regarding knowledge, attitudes, perceived benefits/advantages, perceived threat/disadvantages, perceived barriers, perceived norms, and perceived self-efficacy, 2 overarching themes evolved that have practical implications for future health communication campaigns, including perceived norms and perceptions of harm and health consequences of e-cigarette use. In addition, we also identified important differences in perceptions between nonusers and e-cigarette users that will help inform future health communication campaigns.

One of the most novel findings from the current study included negative perceptions of e-cigarette users and social stigma associated with use. Although many e-cigarettes users perceived that their peers approved of their use of e-cigarettes, nonusers overwhelmingly stated that none of their family or friends would approve of their use of e-cigarettes. Interestingly, for both e-cigarette users and nonusers, one of the themes regarding perceived disadvantages of e-cigarette use included social stigma—perceptions that e-cigarette users possess negative characteristics. The research with respect to perceived norms of e-cigarette use in college students is limited; however, in a study conducted by Berg et al., researchers assessed perceived social acceptability of a variety of tobacco products (conventional cigarettes, cigars, smokeless tobacco, hookah) as well as e-cigarettes and marijuana in a sample of young adults. Results indicated that young adults rated e-cigarettes as among the least socially acceptable products. Our results support these findings, with several

participants stating that use of e-cigarettes was associated with negative perceptions related to addiction and unattractive personality characteristics. Although research examining the association between perceived social acceptability of e-cigarettes and e-cigarette use among college students is limited, a recent study found that college students who agreed with the statements "e-cigarettes look awkward" and "e-cigarettes look unpleasant" had lower odds of both ever and current e-cigarette use. Conversely, college students who scored higher on perceptions of social enhancement, for example, "e-cigarettes look sophisticated," had significantly higher odds of current e-cigarette use. Ultimately, health communication campaigns may be useful in changing perceived norms surrounding e-cigarette use among college students; reminding people of social norms and stigma around a health behavior can contribute to positive behavior change, such as a campus-based campaign that took a norms-based approach to remind students about the social unacceptability of not using proper hand hygiene after using the restroom. This kind of effort could provide a template for reinforcing perceptions of e-cigarette users to discourage others' adoption of e-cigarettes.

Additional findings with particular relevance to future health communication campaigns include harm perceptions and the potential health consequences associated with e-cigarette use. Importantly, the overarching theme of harm associated with e-cigarette use surfaced across the different constructs, including knowledge, attitudes, perceived benefits/advantages, perceived threat/disadvantages, and perceived norms. For example, with respect to knowledge, both nonusers and e-cigarette users expressed the belief that e-cigarettes produce water vapor. Additionally, perceptions of e-cigarettes as less harmful than conventional cigarettes was the most common theme with respect to perceived benefits/advantages of use. This finding is similar to previous research that found that young adults perceive e-cigarettes as less harmful to health as compared with conventional cigarettes. Although not surprising due to the marketing of e-cigarettes as healthier alternative to cigarettes, our findings are concerning due to the fact that lower harm perceptions are associated with higher odds of e-cigarette use in college students. As noted by Grana et al., although e-cigarettes contain lower levels of harmful chemicals as compared with conventional cigarettes, they still contain chemicals such as formaldehyde, nickel, and lead at higher levels than were found in nicotine inhalers. These findings suggest that campaign efforts might be more complicated than health education alone, given industry and advocate claims that e-cigarettes are more healthy (or at least less harmful) alternative to traditional cigarettes are not unfounded. A parallel example may be prescription stimulant misuse. Misuse of prescription stimulants can indeed increase academic performance in the short-term, necessitating truthful messages focused on long-term impacts. Health communication campaigns focused on e-cigarettes must remain realistic and truthful about health impact—compared with traditional cigarette smoking and abstaining from such products altogether—to maintain credibility.

In addition to the 2 themes, understanding differences in perceptions between e-cigarette users and nonusers may be useful in tailoring messaging to prevent or reduce e-cigarette use among college students. For example, most nonusers reported that no one that they knew would approve of their use of e-cigarettes; therefore, campaigns aimed at preventing the initiation of e-cigarette use in college students may benefit from discussing the perceived social stigma associated with use. Contradictory to what e-cigarette advertising and

marketing would like the young adults to think, many of the college students in this study—both users and nonusers—were turned off by negative associations with e-cigarette use. Instead of gaining actual "coolness" and social status as promoted by the industry,⁻ e-cigarette users are seen as only feigning an inauthentic attempt at being cool—not a desirable impression college students would like to make on their peers. Additionally, there were differences in perceived barriers among e-cigarette ever users versus nonusers, including concerns regarding cost of use and potential addiction. Namely, e-cigarette users cited perceptions regarding the cost of e-cigarettes and concerns about addiction as barriers to future e-cigarette use. Importantly, neither of these themes was cited as barriers to use for nonusers. Thus, for health communication campaigns seeking to dissuade e-cigarette users from continued use, an important element to stress is the cost of use.

These findings provide initial insights for how strategic messages could be designed to target e-cigarette use behaviors in college students. Most importantly, ways to address the social stigma associated with e-cigarettes should be considered when designing and developing strategic messages to discourage use. In the same way that advertising and marketing attempt to convey "coolness" with e-cigarettes, messages that discourage e-cigarette initiation or use should incorporate imagery that implicitly connects use of these devices with unappealing, undesirable, or even gross effects, objects, or social situations (such as showing socially ostracized individuals); such messages might even be more effective, as they would be reinforcing what college students already feel to be the case—use of e-cigarettes is not cool. Additionally, 2 key strategies should be considered for informative messages. First, campaigns that clearly communicate that e-cigarette vapor is *not* simply water are imperative to dispel this myth among vulnerable populations. The current prevalence of the "vapor is water" myth among young adults is especially troubling given the likelihood that it could reduce perceived risks of e-cigarette use. Second, informative messages, along with labeling, are needed to provide young adults with accurate information about e-cigarette contents. Knowledge that e-cigarettes contain propylene glycol and additives are an important first step that must be followed with health campaigns to address the health risks associated with these contents—as young adults do not likely know. Furthermore, as the research on constituents present in e-cigarettes is rapidly developing, future health communications must be developed that incorporate the latest findings regarding the safety of e-cigarettes. Education campaigns designed to teach consumers about the contents of traditional cigarettes could provide a useful framework for considering how to approach this health communication challenge.

Limitations and future directions

There are several limitations of the current study that merit mention. Although half of the participants ($n = 15$) reported ever, or lifetime, e-cigarette use, only a few ever users ($n = 3$) reported current use, defined as using in the past 30 days. Thus, the results regarding perceptions and attitudes regarding e-cigarettes may not be applicable to college students who are regular users of e-cigarettes. Additionally, the participants included a small sample of college students who were recruited from one university; thus, the results may not be generalizable to other college populations. The study also asked about constructs specific to the Health Belief Model and the Theory of Planned Behavior; therefore, additional factors

from other theories of health behavior may be important to understanding perceptions about e-cigarettes use in college students. For example, outcome expectancies from Social Cognitive Theory may help explain why individuals chose to use e-cigarettes; for example, beliefs such as e-cigarettes may relieve stress or make the user more relaxed may influence the initiation of use in college students.

As millions of dollars and countless hours of research and public health efforts continue to be dedicated to antismoking— and now potentially antivaping— campaigns, the current conceptualization among young adults from this study can inform thinking about next steps for the field. Although e-cigarettes may have reduced negative health consequences compared with cigarettes, the health risks are still largely unknown. Furthermore, marketing strategies that suggest e-cigarettes are safe alternatives may have more detrimental effects for national antitobacco efforts. By differentiating e-cigarettes (with safety marketing messages), young adults may be more likely to create a new, unique mental category for e-cigarettes, one that is dissociated with the knowledge, risks, and social stigma of traditional cigarettes. Once categorical distinctions are set between e-cigarettes and cigarettes in consumers' minds, they will be hard to change.

Although e-cigarettes are still a new phenomenon, now is time to develop strategies for effective communication and potential policy changes. Less risk does not mean there is no risk. Although some individuals may make an implicit conceptual link between e-cigarettes and cigarette smoking, many do not make the same explicit link when talking about them. Campaigns designed to strengthen the association between smoking and vaping may help fight against current marketing efforts to differentiate (and distance) e-cigarettes from traditional tobacco products and antismoking efforts. Finding ways to communicate the health risks of e-cigarettes, without losing credibility by trying to bridge too big of a gap, may be key to prevent health communication efforts from having to "start over" as the *new* electronic nicotine delivery systems (compared with *old* traditional tobacco cigarettes) become more prevalent.

Conclusions

Guided by the constructs of the HBM and TPB, this formative study provides initial insight into perceptions of e-cigarettes among college students. Importantly, previous qualitative studies have focused on perceptions and reasons for user among e-cigarette users, but have not examined differences in perceptions among e-cigarette users versus nonusers. Therefore, the current study provides much-needed insight into the beliefs of nonusers. By examining differences in perceptions by e-cigarette use category, the current study identified similarities and differences in themes between the 2 groups. In addition, a new theme of social stigma evolved as a perceived disadvantage to e-cigarette use. This finding was surprising, as e-cigarettes are often marketed as attractive and novel products. The results also support previous findings that indicate that reduced harm is a prominent theme with respect to e-cigarette perceptions among young adults. Ultimately, the results will help inform the development of future health communication campaigns aimed at informing both users and nonusers about the potential consequences of e-cigarette use.

Acknowledgments

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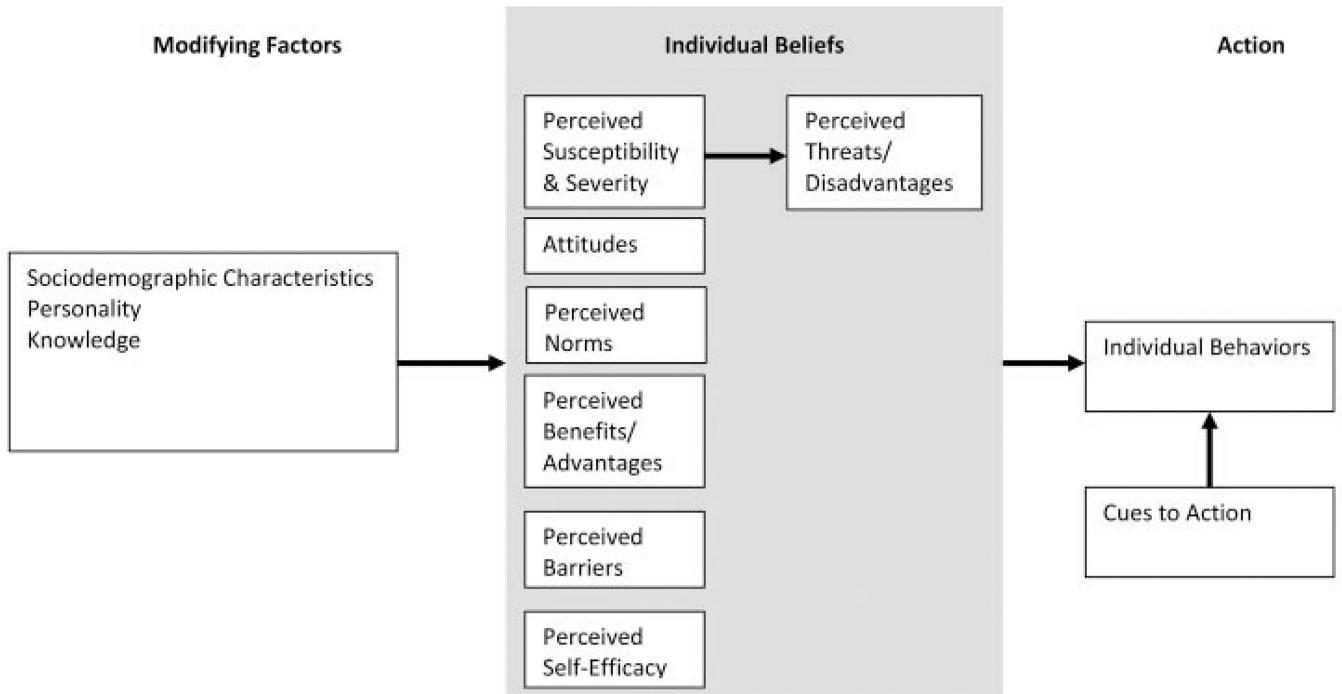
Figure 1.
Integrated theoretical framework. Adapted from Champion and Skinner.

Table 1

Interview guide.

Construct	Elicitation question
Knowledge	What is an e-cigarette? What kind of brands of e-cigarettes have you heard of? Have you ever seen an ad for e-cigarettes? If so, where? Television, magazines, other? Do you know of any other names for e-cigarettes?
Attitudes	How do you feel about the idea of undergraduates using e-cigarettes? What do you like/dislike about e-cigarettes? What do you enjoy/hate about e-cigarettes? What are your opinions when you see someone using an e-cigarette? Does it depend on the location?
Perceived benefit/ perceived advantages	What are some advantages of using e-cigarettes? What are the benefits that might result from using e-cigarettes?
Perceived threat/ perceived disadvantages	What are some disadvantages of using e-cigarettes? What are the negative health effects that might result from using e-cigarettes? Do you think e-cigarettes are less/more harmful than conventional cigarettes? Why?
Perceived barriers	What kinds of barriers do you perceive to using e-cigarettes?
Perceived norms	Who, which people or groups, might approve or support of your use of e-cigarettes? Who, which people or groups, might disapprove of your use of e-cigarettes?
Perceived self-efficacy	If you want to use e-cigarettes, how certain are you that you can?