
Youth generated prevention messages about electronic cigarettes

Dana A. Cavallo^{1*}, Grace Kong¹, Daniel M. Ells¹, Deepa R. Camenga²,
Meghan E. Morean^{1,3} and Suchitra Krishnan-Sarin¹

¹Department of Psychiatry, Yale University School of Medicine, New Haven, CT 06519, USA, ²Department of Emergency Medicine, Yale University School of Medicine, New Haven, CT 06520, USA and ³Department of Psychology, Oberlin College, Oberlin, OH 44074, USA

*Correspondence to: D. A. Cavallo. E-mail: dana.cavallo@yale.edu

Received on November 19, 2017; editorial decision on January 8, 2019; accepted on February 1, 2019

Abstract

Rates of e-cigarette use are high among youth, and there is little known about the long-term health effects of e-cigarettes. Since peer influence is a powerful determinant of tobacco use, we aimed to identify message themes about e-cigarettes that youth would use to encourage or discourage peers from using e-cigarettes. We conducted 10 focus groups ($N = 69$) with non-smokers and smokers from one middle school, high school and college in Connecticut. Participants engaged in a discussion about e-cigarettes, and each participant created one written message to encourage e-cigarette use and one to discourage use among peers. We content-analyzed the messages and identified three main themes and 12 encouraging and discouraging sub-themes. Encouraging themes included health benefits of e-cigarettes relative to cigarettes, attractive product characteristics (e.g. flavors) and social advantages (e.g. positive social image) of using e-cigarettes. Discouraging messages included health risks of e-cigarettes relative to cigarettes, unattractive product characteristics (e.g. cost) and social disadvantages (e.g. negative social image of using an e-cigarette). Overall, there were no differences by sex, age group or smoking status in generation of encouraging and discouraging message themes. This study identified youth-generated themes that may aid in e-cigarette prevention among youth.

Introduction

E-cigarette use rates are high among American youth. National survey data indicate that rates of past month e-cigarette use among middle school (MS) and high school (HS) students remain concerning (9.5% of 8th graders, 14% of 10th graders, 16.2% of 12th graders); [1]. E-cigarette use is also high among young adults. A national consumer-based web survey suggested that 7.8% of young adults (18–24 years) have ever used e-cigarettes [2], and data collected from American college students [3, 4] indicate that about one-third of college students have tried e-cigarettes.

One of the most well-established determinants of youth tobacco use is peer influence. Overall, the effect of friends' cigarette smoking on tobacco initiation is stronger than that of media influence and parental smoking, and it has an even greater effect on smoking initiation in non-smokers than it does on continued smoking in established smokers [5, 6]. In addition, transitions to increased levels of cigarette smoking have been linked to peer encouragement and approval [5] and positive messages communicated about smoking to their peers [7]. Data on peer influences on e-cigarette use are emerging. Recent surveys indicate that peers have also an impact on e-cigarette use, with more than 25% of youth receiving information about e-cigarettes from their friends [8] and 31.6% of youth indicating that peer influence was one of the top reasons they experimented with e-cigarettes [9].

Advertising is another key factor that influences e-cigarette use among youth. According to the most recent Surgeon General's Report, e-cigarette advertising expenditures have increased dramatically [1] and youth are being exposed to e-cigarette messages through advertising in various venues, including the internet, newspapers/magazines, retail stores and television/movies [10]. Much of the advertising content focuses on the purported health aspects and benefits of e-cigarette use compared with cigarette smoking, what is liked and disliked about using e-cigarettes, and reasons for e-cigarette use including curiosity, flavors and low cost [9, 11–13]. Greater exposure to advertisements is also associated with greater curiosity [14, 15] and higher likelihood of using e-cigarettes [13]. Exposure to advertisements is important because persuasive communication plays an important role in changing norms [16]. According to the Theory of Reasoned Action [17], the best predictors of behaviors are the person's attitude toward that behavior and how he/she thinks other people would view him/her if he/she performed the behavior. Since agreement with a norm can be influenced by persuasion, themes used in advertising may be critical in guiding behavior. Although restrictions are in place for cigarette advertising, there currently are no regulations regarding e-cigarette advertising [1]. Thus, public health campaigns need to challenge pro-e-cigarette norms portrayed on advertisements and challenge such themes.

In light of the proactive marketing of e-cigarettes [18] and the limited evidence about the long-term health effects of e-cigarette use [9, 11, 12], it is essential to understand how to effectively communicate information about e-cigarettes to youth and how best to counteract current pro-e-cigarette messages from peers. We do not know enough about the health effects of e-cigarettes and therefore, cannot make health claims similar to those made in the cigarette prevention campaigns. Furthermore, e-cigarettes have unique features making it challenging to transfer concepts over from the literature on combustible products. To date, other researchers have conducted qualitative and quantitative studies in which they have asked youth and adults about beliefs regarding

the relative harms of using e-cigarettes versus smoking traditional cigarettes, including the relative addiction potential of e-cigarettes and whether e-cigarettes are perceived as helping smokers quit smoking. However, there is limited information on whether these factors can be used in the development of prevention messages to deter e-cigarette use. Understanding the information that youth share about e-cigarettes with peers may further assist in the development of prevention messages to address e-cigarette use among youth.

Thus, our aim was to identify message content areas (themes) that youth would use to encourage or discourage their peers from using e-cigarettes. Themes may help guide behavior of our youth in deciding whether to initiate or continue use of e-cigarettes. Targeted messages informed by the target audience are valuable. Group-specific targeted strategies enhance the impact of health information by increasing its relevance to a given audience [19]. Thus, the more one knows about the intended message recipients, the better communication can be made.

Most of the qualitative work on perceptions of e-cigarettes has been conducted with young adults and adults [20–23] and, only more recently, with adolescents [9, 24–26]. Since e-cigarette use is common among adolescents, as well as young adults, we conducted focus groups with MS, HS and college students in which students were asked to generate messages about e-cigarettes that they hypothetically would share with their peers to discourage e-cigarette use. Students were also asked to generate messages that may encourage e-cigarette use to ascertain potential ways to counteract appealing aspects of e-cigarettes in future prevention efforts. Ultimately, themes generated from this formative work could be examined in future studies to see if they alter perceptions and use behaviors. We also explored whether the content of the self-generated messages differed by sex, age and smoking status, especially since some young smokers may be using e-cigarettes for reasons like harm-reduction [9, 27] making perceptions regarding use possibly different from those of non-smokers [28].

Methods

Participants

We conducted 10 focus groups ($N = 69$) from November 2012 to April 2013 to examine knowledge, attitudes and perceptions of tobacco products including e-cigarettes and marketing. The groups consisted of four to eight participants ($M = 6.9$, $SD = 1.37$), with two groups in one MS ($n = 16$), four groups in one HS ($n = 23$) and four groups in one college ($n = 30$) in CT. The total sample ($N = 69$) was 52% male, 36% smokers, 73.9% Caucasian, 11.6% African American, 2.9% Hispanic, 7.2% Asian and 4.3% other or multiple race/ethnicity.

Focus group procedures

Passive parental permission was used in the MSs and HSs. Specifically, prior to participant recruitment, information sheets describing the focus groups were mailed to parents who were instructed to contact research staff within 2 weeks if they did not want their child to participate. MS and HS participants were recruited using flyers posted at the schools and through a school staff member who made school-wide announcements about the study and coordinated the recruitment visits conducted by research staff. College students were recruited via information cards that described the study and provided a link and a Quick Response code that directed them to the study website for screening questions (e.g. demographics, cigarette use and availability for attending focus groups).

The focus groups were held in the school after hours for MS and HS students and during early afternoon and evening hours for college students. Study staff reviewed the procedures, voluntary nature of the study and limits to confidentiality with all participants before starting the focus groups. Written assent (for those <18 years of age) or consent (for those ≥ 18 years of age) was obtained. Participants were provided with refreshments at the focus groups and were compensated for their participation (MS/HS students: \$25; college students: \$50). All study procedures were approved by the Yale Institutional

Review Board and the participating school superintendents and/or administrators.

Focus group moderators led 1-h focus groups, using a structured discussion guide to assess youth perceptions of various tobacco products (including e-cigarettes), reasons for use, social norms surrounding use, perceptions of risk and marketing of tobacco products (see Kong *et al.* [9] for additional details). After the discussion period and as part of this larger focus group study, participants completed an exercise in which they were prompted to write one message that would encourage individuals their age to use e-cigarettes. Participants were then asked to create a message to discourage individuals their age from using e-cigarettes. Moderators invited participants to share some of their messages with the group and asked follow-up questions regarding the aspects of the message that would appeal to people their age to enhance clarity and better discern themes.

All students were debriefed about the risks of using tobacco products at the end of the focus group. A member of the study staff took comprehensive notes throughout each group, and all groups were voice recorded. An independent transcriptionist subsequently transcribed focus group content verbatim. Participants' hand-written messages were also collected and entered into a spreadsheet for analysis. Two members of the research team independently reviewed messages to identify relevant coding themes across groups using a framework analysis technique [29] to allow for the analysis of *a priori* themes identified by the researchers [9] and emergent themes. All messages were coded separately by two researchers and multiple themes were identified in each message when applicable. Any discrepancy between the coders was amended until consensus was reached. Specific themes included peer and family influence, coolness, curiosity, availability, flavors, cost, health and satisfaction comparison with cigarettes, smell, convenience, ability to conceal, negative physical effects and taste. Chi-square analyses were run to examine potential differences in themes generated by smokers and non-smokers, by males and females and by age group (i.e. MS, HS, college).

Results

We identified three main themes within the written messages: health effects, product characteristics and social effects of e-cigarettes. Within these main themes, we further identified 12 encouraging and 12 discouraging e-cigarette message themes (Fig. 1). Encouraging themes included health benefits of using e-cigarettes versus cigarettes (30.1%; e.g. less addictive), social advantages of e-cigarette use (8.5%; e.g. cool social image) and attractive product characteristics of e-cigarettes (55.4%; e.g. low cost). Discouraging messages included health risks of using e-cigarettes (68.0%; e.g. similar health risks as cigarettes), social disadvantages of using e-cigarettes (6.0%; e.g. having the social image of a smoker) and unattractive product characteristics (26.0%; e.g. financial cost). Many group members incorporated multiple themes within each written message (e.g. ‘*E-cigarettes are better for your health and also less addicting.*’). These types of messages were coded for two themes (i.e. decreased health risk and less addictive).

The individual themes are presented below with exemplars of the messages developed by focus group participants.

Encouraging message themes

Health benefits of e-cigarettes

Overall, **decreased health risk** relative to cigarettes was a common theme, with 12.7% of all encouraging messages containing themes about possible health benefits of e-cigarettes. Encouraging use messages included statements about reduced cancer risk and less overall physical harm (e.g. ‘Smoking can harm lungs. That’s why you’re risk free when smoking these [e-cigarettes].’—female HS smoker).

Furthermore, 10.9% of the messages incorporated perceived **safer product components**. For example, a male HS smoker wrote, ‘Emits water vapor and requires no flame,’ and a female college smoker wrote, ‘Why smoke tar when you can puff on water vapor?’

Some participants (5.5%) also mentioned that e-cigarettes **help with smoking cessation**, with one

female MS participant suggesting that using e-cigarettes may be a safer method because they have less nicotine than cigarettes.

Attractive product characteristics of e-cigarettes

The most frequently endorsed theme for encouraging e-cigarette use was **satisfying flavors** (15.2%). Many students noted the variety of available e-cigarette flavors (e.g. ‘E-cigarette: so many flavors, at least one will speak to you!’—female college smoker). Some mentioned specific flavors that were perceived to taste better than regular cigarettes (e.g. ‘They come in many different flavors like bubblegum.’—female MS non-smoker) and a couple mentioned the lack of the bad taste associated with smoking a cigarette (e.g. ‘so you don’t have to taste that nasty smoke again’—female college smoker).

The **convenience of using e-cigarettes** (13.3%) such as noting the ability to use e-cigarettes anywhere and not having to find a place that permits smoking was indicated as an appealing aspect of using e-cigarettes, especially among smokers (e.g. ‘Do you love smoking but have to smoke outside? Try our e-cig and smoke anywhere you like.’—male college smoker).

The **low financial cost** (9.1%) of using e-cigarettes was another theme generated. Participants mentioned the savings associated with using e-cigarettes instead of traditional cigarettes, an aspect that might appeal to youth with limited income (e.g. ‘2 Packs worth of cigarettes for only \$9.95!’—male college smoker).

The **visual appeal** of e-cigarettes (6.7%) was another message theme. For example, students commented on e-cigarettes being durable, smokeless and emitting a glow (e.g. ‘...and if that’s not enough to get you convinced, here’s something that you’ll like... THEY GLOW!!!’—female MS non-smoker). Comments were also made about e-cigarettes being the ‘latest thing,’ ‘a unique invention’ and ‘futuristic.’

A few participants identified the **lack of a smoke odor** (6.1%) from an e-cigarette as a feature that

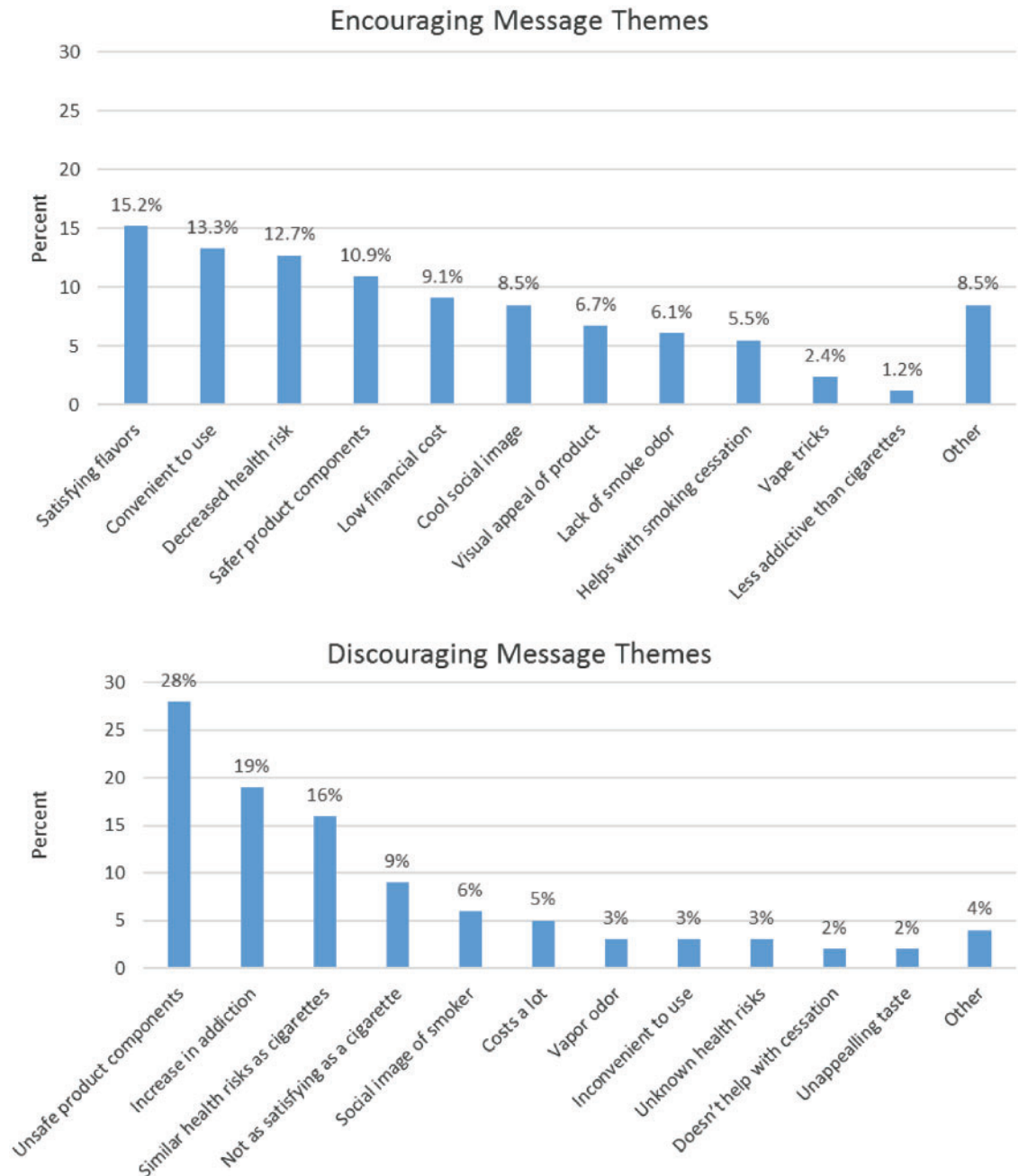


Fig. 1. Encouraging and discouraging message themes about e-cigarettes in a sample of Connecticut MS, HS and college students ($n = 69$).

may encourage use among peers, while one participant (1.2%) suggested that e-cigarettes are **less addictive** than cigarettes.

Finally, the ability to do **vape tricks** (2.4%) was also mentioned by one college female smoker and one HS male non-smoker. Vape tricks may increase the personal appeal of e-cigarettes, regardless of smoking status, since performance of tricks makes the e-cigarette seem more like a ‘toy’ [30].

Social advantages of e-cigarettes

Having a **cool social image** (8.5%) was important to adolescents and young adults who made comments about how others might perceive them favorably if they used an e-cigarette. The encouraging messages focused on social acceptance (e.g. ‘Fit in with your friends and don’t pay the price.’—female college non-smoker).

Other

The remainder of the messages (8.5%) included messages that did not fit in with the other themes, such as ‘they get you high sometimes.’

Age, sex and smoking status

Health effects, social advantages and product characteristics of e-cigarettes were equally mentioned in the messages of both MS (28%), HS (36%) and college students (36%); ($\chi^2 = 2.7, P = 0.607$), females (64%) and males (36%); ($\chi^2 = 4.6, P = 0.099$) and non-smokers (66%) and smokers (34%); ($\chi^2 = 0.67, P = 0.716$), indicating similar themes developed for peer messages regardless of these demographic variables.

Discouraging message themes

Health risks of e-cigarettes

More than a quarter of the messages (28%) included a theme about **unsafe product components** of e-cigarettes, suggesting that e-cigarettes are unsafe because there is not much known about the product. Messages included the unknown health effects of vapor and other chemical consumption (e.g. ‘Questionable chemicals infused with water vapor that can absorb into your lungs.’—female HS smoker).

An **increase in addiction** was also a common discouraging theme (19%). Messages highlighted the fact that the nicotine in e-cigarettes is just as addictive as the nicotine in traditional cigarettes (e.g. ‘Electronic cigarettes may look harmless, but they’re not. They still contain nicotine an addictive drug.’—male MS non-smoker).

Messages stating that e-cigarettes have **similar health risks as cigarettes** were common (16%). These included comments on how the only difference between traditional cigarettes and e-cigarettes is the electronic component. Comments were made that, ‘smoking is smoking’ regardless of the nicotine delivery agent, indicating that an e-cigarette is perceived as comparable with a traditional cigarette (e.g. ‘The only difference is the charger, it’s not so cool when you’re six feet under.’—male HS non-smoker).

A few messages emphasizing the **unknown health risks** of e-cigarettes (3%) were also mentioned (e.g. ‘This may cause lung cancer or other disabilities.’—male MS non-smoker).

While discouraging messages related to e-cigarettes **helping with smoking cessation** were less common (2%), there was some consensus that quitting smoking was not always the actual outcome, suggesting that e-cigarettes do not always lead to cigarette cessation even if the intention is to quit.

Unattractive product characteristics of e-cigarettes

Personal losses were also mentioned in messages. Some (9%) mentioned that e-cigarettes are **not as satisfying or appealing as cigarettes** (e.g. ‘Doesn’t give you the same head rush’—female college smoker).

Although saving money was an encouraging e-cigarette use theme generated by participants, some youth (5%) cited the **cost** of e-cigarettes as a deterrent to use (e.g. ‘Just as expensive for less of an experience’—male college smoker and ‘...a waste of money.’—male MS non-smoker).

A small percentage (3%) cited the **inconvenience** of having to keep an e-cigarette charged as a deterrent for e-cigarette use (e.g. ‘If you don’t use

electronic cigarettes you won't have to carry the charger with you and always have to worry about charging.'—female college non-smoker). Furthermore, a theme emphasizing **taste** (2%) as unappealing was rare, but still mentioned. The remainder of the themes fell into the 'other' category and included messages such as 'Don't let technology sway your opinion' and 'Don't smoke this, you will ruin your athletic career.'

Discouraging messages related to **odor** (3%) revealed that e-cigarette vapor does not smell any better than traditional cigarette smoke (e.g. 'E-cigarettes promote smoking and still smell bad. ...'—female HS non-smoker).

Social disadvantages of e-cigarettes

Discouraging messages about **social image** (6%) were direct, suggesting how unacceptable it looks to smoke a 'fake' cigarette (e.g. 'People can make fun of them for not being real cigarettes,'—female college non-smoker and 'Look like a fool.'—male MS non-smoker).

Other

The remainder of the messages (4%) included messages that did not fit in with the other themes, written by non-smokers, such as 'Don't be fooled by new things.'

Age, sex and smoking status

Overall, there was no statistically significant difference among MS (23.5%), HS (32.4%) and college students (44.1%); ($\chi^2 = 1.9, P = 0.752$) or males (48.5%) and females (51.5%); ($\chi^2 = 3.6, P = 0.164$) in discouraging message themes. Similarly, there were no differences in the messages of smokers (29%) and non-smokers (71%) in discouraging messages about e-cigarettes ($\chi^2 = 5.5, P = 0.064$).

Discussion

This study adds to the literature by identifying youth-generated themes that may be used to generate future messages to effectively prevent e-cigarette uptake among youth. Overall, messages addressed

health effects and social advantages and disadvantages of e-cigarette use, as well as attractive and unattractive product characteristics. The top three encouraging messages included satisfying flavors, convenience of use and decreased health risk (relative to cigarettes), and the top three discouraging messages included unsafe product components, the increased risk of addiction, and similar health risks as cigarettes. Our data provide insight into the qualities associated with e-cigarettes that both encourage and discourage use in youth.

Furthermore, our results demonstrated that there were no differences by sex, age group or smoking status. Smokers and non-smokers, regardless of sex or age group, generated similar encouraging message themes regarding health, social and product characteristics of e-cigarettes. Also, they all developed discouraging peer messages related to the health disadvantages associated with e-cigarettes, such as having health risks similar to cigarettes. They generated similar messages because of the types of messages they have been exposed to (e.g. advertising suggesting e-cigarettes are less harmful; popular media articles and websites making the same claims). Youth generally agree that traditional cigarette smoking is unhealthy, even though many underestimate their personal risk relative to their peers [31–33]. However, perceptions of harm associated with using alternative tobacco products, like e-cigarettes, are less well documented. Many researchers suggest that adolescents [9, 26, 34, 35] and young adults [20, 36] perceive electronic cigarettes as having fewer health risks and being a healthier alternative to combustible products. However, it is unclear if smoking status contributes to these beliefs. One study [35] found that current smokers, relative to never smokers and experimenters, perceive e-cigarettes as less harmful than conventional cigarettes. An additional study [26] found that, although smokers were more likely perceive e-cigarettes as healthier than cigarettes because they are not combustible, both smokers and non-smokers had uncertainty about product constituents, most notably 'water vapor.' Since the true negative health consequences of e-cigarettes are still not clearly known, similar messages were endorsed by all participants.

The messages generated by youth in this study highlight several common misperceptions about e-cigarettes, which could be targeted in health education messages. For example, suggesting that ‘smoking is smoking’ is erroneous, because e-cigarette and cigarette use are not the same. Furthermore, suggesting that e-cigarettes contain harmless water vapor is incorrect, as the vapor that is emitted from e-cigarettes actually is aerosol that contains a mixture of nicotine, flavorings and other ingredients that can be toxic [37]. Another misperception that could be considered is that e-cigarettes are characterized as cool. Khoury *et al.* [38] found 72% of their adolescent survey sample reporting use of e-cigarettes because they were cool, fun and new. Similarly, other surveys in Hawaii [39] and Connecticut [9] have identified curiosity and exploration as key reasons for use. The ‘coolness’ factor of e-cigarettes needs to be challenged. Youth are attracted to e-cigarettes by everything from numerous flavor combinations and fancy devices to vape tricks and cloud competitions [9, 40]. These misperceptions justify stronger education and prevention efforts for e-cigarettes.

The study findings should be considered in light of several limitations. First, our relatively small sample is unlikely to be representative of the entire population of youth, given that we recruited both e-cigarette users and non-users. Second, we identified e-cigarette users based on self-report and did not confirm use status with biochemical verification. Third, our sample was restricted to schools in Connecticut, and the focus groups were conducted in 2013. Additional research using larger, more current, representative samples is needed. Fourth, the exercise about generating messages came after the discussion about e-cigarette perceptions and behaviors, which may have influenced the messages generated by youth. It is also possible that some of the statements generated by youth to discourage e-cigarette use may not translate into effective prevention messages; future research is needed to evaluate the extent to which these messages translate into effective prevention efforts. However, a significant strength of our study is the fact that messages were generated by youth rather than by researchers,

which may increase the credibility and generalizability of the identified themes within other samples of adolescents and young adults.

The current findings have several important implications for future research. First, the identified themes may help guide behavior of our youth in deciding whether to initiate or continue use of e-cigarettes. Also, the findings of this study could aid tobacco prevention efforts by providing insight into how to effectively communicate messages about e-cigarettes to youth to prevent potential nicotine uptake and eventual addiction. In message development, it is important to customize messages to the target audience to maximize their strength and influence [20–22]. The message themes could be tailored and targeted for youth smokers who are using e-cigarettes for harm reduction and those who are experimenting and not established tobacco users. Thus, future research could test whether these themes are persuasive among youth. Furthermore, it is critical to correct the misperceptions that youth have about e-cigarettes and to better disseminate information about e-cigarettes that is derived from empirical evidence. Themes identified in this study could assist in the regulation of e-cigarette marketing content. For example, it has been observed that youth find the availability of diverse flavors appealing [9], so the advertising of diverse flavors could be prohibited. Indeed, the FDA began to make some restrictions on advertisements. As of August 2016, advertisements cannot make health claims about e-cigarettes, such as stating that e-cigarettes are healthier than smoking a cigarette, and, as of August 2018, all e-cigarette packaging requires a standardized nicotine addictiveness warning statement. Future research is needed to discern whether these themes are salient to a broader population of youth and if they change perceptions, beliefs or attitudes.

In sum, the ultimate goal of this study was to identify preliminary themes related to e-cigarette use that may be used to inform the future development and delivery of effective e-cigarette prevention efforts. Messages created by youth about e-cigarettes had various themes that stressed the health effects, social effects and product characteristics of

e-cigarettes, such as health risk/benefit, flavor, convenience, addiction potential and cost.

Acknowledgments

We thank Amanda Palmer for assisting with the focus group data collection and Dr Sandra Bulmer of Southern Connecticut State University for organizing the college focus groups.

Funding

This work was supported by National Institute on Drug Abuse (P50DA009241, P50DA036151, K12DA033012, UL1TR000142 and KL2TR000140). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Drug Abuse.

Conflict of interest statement

None declared.

References

- U.S. Department of Health and Human Services. E-cigarette use among youth and young adults. In: U. S. D. o. H. a. H. S. A. R. o. t. S. (eds). *General*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.
- King BA, Patel R, Nguyen KH *et al*. Trends in awareness and use of electronic cigarettes among US adults, 2010–2013. *Nicotine Tob Res* 2015; **17**: 219–27.
- Brown EM, Henes AL, Olson LT. E-cigarette policies on college campuses: student use behaviors, awareness, and policy support. *J Community Health* 2016; **41**: 1110–5.
- Saddleson ML, Kozlowski LT, Giovino GA *et al*. Risky behaviors, e-cigarette use and susceptibility of use among college students. *Drug Alcohol Depend* 2015; **149**: 25–30.
- Flay BR, Phil D, Hu FB *et al*. Psychosocial predictors of different stages of cigarette smoking among high school students. *Prev Med* 1998; **27**: A9–18.
- Hwang JH, Park SW. Association between peer cigarette smoking and electronic cigarette smoking among adolescent nonsmokers: a national representative survey. *PLoS One* 2016; **11**: e0162557.
- Hoffman BR, Sussman S, Unger JB *et al*. Peer influences on adolescent cigarette smoking: a theoretical review of the literature. *Subst Use Misuse* 2006; **41**: 103–55.
- Cho JH, Shin E, Moon SS. Electronic-cigarette smoking experience among adolescents. *J Adolesc Health* 2011; **49**: 542–6.
- Kong G, Morean ME, Cavallo DA *et al*. Reasons for electronic cigarette experimentation and discontinuation among adolescents and young adults. *Nicotine Tob Res* 2015; **17**: 847–54.
- Singh T, Agaku IT, Arrazola RA *et al*. Exposure to advertisements and electronic cigarette use among US middle and high school students. *Pediatrics* 2016; **37**. pii: e20154155. doi: 10.1542/peds.2015-4155.
- Bold KW, Kong G, Cavallo DA *et al*. Reasons for trying e-cigarettes and risk of continued use. *Pediatrics* 2016; **138**. pii: e20160895. doi: 10.1542/peds.2016-0895 (Epub 2016 August 8).
- Margolis KA, Nguyen AB, Slavitt WI *et al*. E-cigarette curiosity among U.S. middle and high school students: findings from the 2014 National Youth Tobacco Survey. *Prev Med* 2016; **89**: 1–6.
- Pokhrel P, Fagan P, Kehl L *et al*. Receptivity to e-cigarette marketing, harm perceptions, and e-cigarette use. *Am J Health Behav* 2015; **39**: 121–31.
- Dinakar C, O'Connor GT. The health effects of electronic cigarettes. *N Engl J Med* 2016; **375**: 1372–81.
- Kaisar MA, Prasad S, Liles T *et al*. A decade of e-cigarettes: limited research & unresolved safety concerns. *Toxicology* 2016; **365**: 67–75.
- McGuire WJ. Public communication as a strategy for inducing health-promoting behavioral change. *Prev Med* 1984; **13**: 299–319.
- Fishbein M, Ajzen I. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley, 1975.
- Dai H, Hao J. Direct marketing promotion and electronic cigarette use among US adults, National Adult Tobacco Survey, 2013–2014. *Prev Chronic Dis* 2017; **14**: E84.
- Kreuter MW, Wray RJ. Tailored and targeted health communication: strategies for enhancing information relevance. *Am J Health Behav* 2003; **27**(Suppl 3): S227–32.
- Choi K, Fabian L, Mottey N *et al*. Young adults' favorable perceptions of snus, dissolvable tobacco products, and electronic cigarettes: findings from a focus group study. *Am J Public Health* 2012; **102**: 2088–93.
- Choi K, Forster JL. Beliefs and experimentation with electronic cigarettes: a prospective analysis among young adults. *Am J Prev Med* 2014; **46**: 175–8.
- Kim H, Davis AH, Dohack JL *et al*. E-cigarettes use behavior and experience of adults: qualitative research findings to inform e-cigarette use measure development. *Nicotine Tob Res* 2017; **19**: 190–6.
- Simmons VN, Quinn GP, Harrell PT *et al*. E-cigarette use in adults: a qualitative study of users' perceptions and future use intentions. *Addict Res Theory* 2016; **24**: 313–21.
- Camenga DR, Cavallo DA, Kong G *et al*. Adolescents' and young adults' perceptions of electronic cigarettes for smoking cessation: a focus group study. *Nicotine Tob Res* 2015; **17**: 1235–41.
- Hilton S, Weishaar H, Sweeting H *et al*. Cigarettes, a safer alternative for teenagers? A UK focus group study of teenagers' views. *BMJ Open* 2016; **6**: e013271.

26. Wagoner KG, Cornacchione J, Wiseman KD *et al.* E-cigarettes, hookah pens and vapes: adolescent and young adult perceptions of Electronic Nicotine Delivery Systems. *Nicotine Tob Res* 2016; **18**: 2006–12.
27. Camenga DR, Kong G, Cavallo DA *et al.* Current and former smokers' use of electronic cigarettes for quitting smoking: an exploratory study of adolescents and young adults. *Nicotine Tob Res* 2016; **19**: 1531–35.
28. Harris JK, Cohen EL, Wyrwich KW *et al.* Differences in smokers and nonsmokers' assessments of an educational campaign about tobacco use. *Health Educ Behav* 2011; **38**: 574–83.
29. J R. J. a L. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. London: Sage Publications, 2003.
30. McDonald EA, Ling PM. One of several 'toys' for smoking: young adult experiences with electronic cigarettes in New York City. *Tob Control* 2015; **24**: 588–93.
31. Shepperd JA, Klein WM, Waters EA *et al.* Taking stock of unrealistic optimism. *Perspect Psychol Sci* 2013; **8**: 395–411.
32. Slovic P. Do adolescent smokers know the risks? *Duke Law J* 1998; **47**: 1133–41.
33. Weinstein ND, Marcus SE, Moser RP. Smokers' unrealistic optimism about their risk. *Tob Control* 2005; **14**: 55–9.
34. Bernat D, Gasquet N, Wilson KO *et al.* Electronic cigarette harm and benefit perceptions and use among youth. *Am J Prev Med* 2018; **55**: 361–7.
35. Ambrose BK, Rostron BL, Johnson SE *et al.* Perceptions of the relative harm of cigarettes and e-cigarettes among U.S. youth. *Am J Prev Med* 2014; **47**: S53–60.
36. Pokhrel P, Herzog TA, Fagan P *et al.* E-cigarette advertising exposure, explicit and implicit harm perceptions, and e-cigarette use susceptibility among non-smoking young adults. *Nicotine Tob Res* 2018; **21**: 127–31.
37. Goniewicz ML, Knysak J, Gawron M *et al.* Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. *Tob Control* 2014; **23**: 133–9.
38. Khoury M, Manlhiot C, Fan CP *et al.* Reported electronic cigarette use among adolescents in the Niagara region of Ontario. *CMAJ* 2016; **188**: 794–800.
39. Wills TA, Knight R, Williams RJ *et al.* Risk factors for exclusive e-cigarette use and dual e-cigarette use and tobacco use in adolescents. *Pediatrics* 2015; **135**: e43–51.
40. Pepper JK, Lee YO, Watson KA *et al.* Risk factors for youth e-cigarette "Vape Trick" behavior. *J Adolesc Health* 2017; **61**: 599–605.