


Vaping Expectancies: A Qualitative Study among Young Adult Nonusers, Smokers, Vapers, and Dual Users

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ABSTRACT

BACKGROUND: “Expectancies,” or beliefs about outcomes, robustly correlate with and predict several behaviors including electronic nicotine delivery system (“e-cigarette”) use. However, there is limited qualitative research available regarding relevant e-cigarette vaping expectancies.

OBJECTIVES: The present study used a qualitative approach to derive and refine e-cigarette expectancy themes among young adults.

METHODS: We conducted 12 focus groups and two individual interviews with young adult *nonusers*, e-cigarette *vapers*, cigarette smokers, and dual users to assess beliefs about the effects of e-cigarettes. After a series of open-ended questions, follow-up questions assessed reactions to domains previously examined in expectancy measures for cigarette smoking and e-cigarette vaping. The constant comparative method was used to derive themes from transcripts.

RESULTS: Four main themes (*Positive Reinforcement*, *Social Benefits*, *Negative Affect Reduction*, *Negative Consequences*) emerged from the results. Each theme contained three associated subthemes (*Positive Reinforcement*: Sensorimotor Experiences, Taste, Stimulation; *Social Benefits*: Social Facilitation, Influence on Others, Convenience; *Negative Affect Reduction*: Stress Reduction, Appetite Reduction, Boredom Reduction; and *Negative Consequences*: Health Risks, Addiction, Secondhand Effects).

CONCLUSIONS/IMPORTANCE: Previously identified smoking expectancies appear relevant for young adult vaping, with some notable refinements. Positive reinforcement aspects encompassed aerosol clouds, vaping tricks, and unique flavors. Social benefits included influencing others via social media and competitive activity, as well as the convenience of use in a variety of places. Negative affect reduction was controversial among user groups, but vaping was seen as more interesting than smoking and thus more effective at boredom reduction. Young adults were uncertain regarding negative consequences, but appreciated a potential for secondhand effects. Measure refinement via qualitative research and future field testing can enhance our understanding of this relatively new behavior, supporting tobacco control surveillance, marketing/labeling regulations, and counter-advertising development/evaluation.

KEYWORDS: electronic nicotine delivery systems, qualitative research, surveys and questionnaires, young adult

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Introduction

The impact of electronic nicotine delivery systems (“e-cigarettes”) on population health continues to be controversial. The extent to which e-cigarettes are helpful or harmful to public health will depend on the differential impact concerning two key groups: (1) cigarette smokers seeking to quit; and (2) youth susceptible to smoking.^{1–3} For cigarette smokers seeking to quit, switching from cigarette smoking to e-cigarette “vaping” may be an effective harm reduction technique, given the substantially lower levels of harm found with e-cigarette use to

date.^{1,4,5} However, e-cigarettes are not harmless^{6,7} and the evidence regarding the effectiveness of e-cigarettes for quitting cigarette smoking, although supportive, also suggests that long-term use is common.^{8,9} Thus, current evidence allows for the possibility that e-cigarettes may improve the health of cigarette smokers, provided they are motivated to completely quit smoking. However, long-term use remains a concern.

For youth nonsmokers, there is considerably more concern regarding the rapid levels of growth.^{10,11} There is widespread agreement that e-cigarette initiation among nonsmokers,



particularly youth, should be avoided. The only debate, if any, is regarding whether or not the rates of youth usage constitute an epidemic.^{12,13} Given that data showing e-cigarette use among youth and young adults is associated with the initiation, persistence, and escalation of cigarette smoking,^{7,14} e-cigarettes potentially could slow or even reverse reductions in cigarette smoking.

Understanding e-cigarette attitudes and use patterns among young adults may be particularly important. Young adults are more likely than older adults to experiment with e-cigarettes, whether or not they have ever smoked cigarettes.¹⁵ This age range, sometimes referred to as “emerging adulthood” represents a time when youth transition into social contexts (eg, college, workplaces) with tolerance or even promotion of risky behaviors, often resulting in an increased prevalence of substance use and the development of addictive patterns.^{16,17} Almost all (99%) of those with a history of daily cigarette smoking report trying their first cigarette before the age of 26 years.¹⁸ Although adolescent smoking in the United States has decreased dramatically since 2011, the likelihood of young adult smoking initiation has increased.¹⁹ Indeed, since approximately 2004, nicotine initiation in young adulthood is now more likely than adolescence.^{20,21} As such, young adults are an ideal population for helping to understand the potential long-term impact of e-cigarettes on public health.

One prominent theoretical construct in predicting behavior, based on social cognitive theory, is referred to as “outcome expectancy,” that is, belief about the result of a behavior.²² Drug outcome expectancies refer to beliefs about the results of drug use and are a key tool in predicting substance use initiation and continued use.²³ Before use of a substance, drug expectancies are believed to develop from observation via the media, peers, and family members.²⁴ After use initiation and during continued use, expectancies tend to become stronger, more specific, and more positive (eg, “smoking will help me relax around friends”).²⁵ E-cigarette expectancies are associated with e-cigarette initiation,^{26–28} switching from combustible cigarettes to e-cigarettes,²⁹ vaping frequency and dependence,³⁰ and intention to quit e-cigarettes.²⁹

Prior e-cigarette expectancy research primarily used adaptations of existing smoking expectancy measures (eg, “smoking calms me down when I feel nervous” altered to “vaping calms me down when I feel nervous”).^{26,27,29–32} For example, 28 of 40 items initially used by Pokhrel and colleagues²⁶ and 9 of 14 items used by Harrell and colleagues³¹ were directly derived from prior smoking expectancy measures. Other research by Hershberger and colleagues²⁸ used items from a broad variety of sources, including items previously found to be predictive of use or intent to use e-cigarettes and beliefs previously found to be targeted in e-cigarette advertisements,^{26,27,33–35} to create a Comparing E-cigarettes and Cigarettes questionnaire.²⁸ Implicit in much of this research is the assumption that e-cigarette use may be driven by motives similar to cigarette smoking. However, there is little research examining this issue directly.

Qualitative research conducted so far suggests young adult perceptions regarding e-cigarettes may be unique from cigarette smoking. E-cigarette users in Hawaii reported distinctive beliefs related to social, recreational, and sensory outcomes. These included positive beliefs, such as sensory satisfaction, social enhancement, and control over intake, as well as negative beliefs, such as addiction, health consequences, and high expenditures.³⁶ Focus groups in Connecticut found adolescents and young adults reporting benefits of e-cigarettes including usefulness in quitting cigarette smoking, but also concerns regarding lack of satisfaction, nicotine addiction maintenance, and health impact.^{37,38} In North Carolina, youth reported appreciating the flavor variety and reduced harm, as well as the ability to modify nicotine content and perform tricks (e.g. French inhale), but disliked the uncertainty regarding content, the addictive potential, and the lack of a cue to stop use.³⁹

The present study adds to the literature by using qualitative methods to probe for e-cigarette expectancies among young adults. We aspired to understand both why some young adults use e-cigarettes (ie, risk factors for use), and why some do not use e-cigarettes (ie, protective factors against use). Further, beliefs among cigarette smokers are important to understand, as there are considerable concerns regarding prolonged dual use of both substances or transition from e-cigarettes to cigarettes.⁷ To investigate these issues, we assembled groups of young adults stratified by their use of cigarettes and e-cigarettes.

Methods

Procedures

Young adults (aged 18–29 years) were recruited from a large metropolitan city in southeastern United States from November 2015 through May 2016. Advertisements publicized a paid opportunity for young adults to provide opinions about e-cigarettes and vaping. Interested participants were screened over the phone to assess if they met inclusion and exclusion criteria for one of the groups for which we were recruiting. Stratification of cigarette use and e-cigarette use yielded four group categories: *nonusers*; *cigarette smokers*; *e-cigarette vapers*; and *dual users*. Screening questions asked about prior and current use of cigarettes and e-cigarettes. Based on prior research regarding “established” e-cigarette use, as well as the use of a young adult sample, criteria for substance use included 50 or more lifetime use occasions.⁴⁰ As shown on Table 1, *nonusers* reported no use of either product in the past month and no more than 50 lifetime use occasions; *cigarette smokers* reported smoking at least 50 times, current daily smoking, and no e-cigarette use in the past month; *e-cigarette vapers* reported using e-cigarettes at least 50 times, current daily e-cigarette use, and no smoking in the past month; and *dual users* reported using e-cigarettes at least 50 times, current daily use of either substance, and past-week use of both substances. We focused on daily, rather than nondaily use, in an attempt to get opinions from consistent, informed users. We screened

Table 1. Focus group inclusion criteria: stratification by cigarette and e-cigarette use.

	NO CIGARETTE USE	CIGARETTE USE
No e-cigarette use	<i>Nonusers</i> Less than 50 times smoking cigarettes Less than 50 times using e-cigarettes No smoking or e-cigarette use in past month	<i>Cigarette smokers</i> Established smoking (50+ times) Current daily smoking No e-cigarette use in past month
E-cigarette use	<i>E-cigarette vapers</i> Established e-cigarette use (50+ times) Current daily e-cigarette use No smoking in past month	<i>Dual users</i> Established e-cigarette use (50+ times) Current daily use of either substance Past-week use of both substances

209 individuals. Of these, 42 were ineligible due to past-month nondaily use, 29 were ineligible due to age, 9 met criteria for a group for which we were not currently recruiting, and 3 were ineligible due to recent experimental e-cigarette use (<50 lifetime occasions). The remaining 121 met qualification criteria for one of the groups. However, most of these participants were unable to meet during a planned time and did not respond to attempts to follow-up. We enrolled 49 participants in total.

We conducted a total of 14 sessions. These included four focus groups involving young adult *nonusers* (n = 3, 5, 8, 5), three exclusive *cigarette smoker* groups (n = 2, 3, 2), three exclusive *e-cigarette vaper* groups (n = 8, 2, 2), two *dual user* groups (n = 2, 4), and two individual interviews with *dual users*. These additional individual interviews were conducted due to both difficulty in recruiting dual users and perceived importance of their perspective, as arguably the most risky group.^{41,42} Sessions were either conducted at a local community college or at a medical school located near both a community college and a 4-year university. Two research team members, a moderator and a notetaker, facilitated each meeting. Sessions were digitally recorded and lasted approximately 1 hour. To verify smoking status, a Vitalograph BreathCO monitor was obtained to provide expired air carbon monoxide (CO) concentration readings.

After informed consent, the moderator began the session with the aid of a semi-structured interview guide. The session began with a brief summary of the expectancy concept and the research goal of examining expectancies for e-cigarette use. Participants were initially encouraged to respond broadly regarding what they would expect to happen if they were to use an e-cigarette. Follow-up questions were then asked to ensure that all beliefs regarding short-term, long-term, positive, negative, personal, and social effects were addressed. Next, if not previously mentioned, themes from cigarette smoking expectancy questionnaires,^{32,43–45} and the limited research on e-cigarette expectancies available,^{26,27,31} were probed. These included assessment of four domains previously found to be important for college students and adults: Health Risks, Stimulation/State Enhancement, Negative Affect Reduction, and Weight Control;^{43,44} three domains found to be relevant for adolescents, college students, and adults: Social Impression, Social Facilitation, and Boredom Reduction;^{26,44} and a domain that was cited as an important factor for e-cigarette initiation:

Sensory Experience.²⁶ Lastly, participants were asked if there were any areas not discussed and if there was anything they wished to add. Participants received \$25 for participation. The study protocol was approved by a medical school Institutional Review Board.

Analysis

Audio recordings were transcribed into verbatim transcripts. Interim analysis was conducted after each set of focus groups to examine if saturation had occurred, that is, themes were being repeated by multiple participants and no new information was emerging.⁴⁶ Based on quality standards for qualitative research,^{47,48} transcripts were coded using inductive content analysis and the constant comparative method.⁴⁹ Specifically, the initial code book included the eight *a priori* themes (domains from the literature) from the interview guide. This allowed for an initial framework upon which subsequent coding could expand on or refute. Transcripts were coded independently by at least two coders, including the lead author and research assistants trained in qualitative coding. If ideal levels of reliability ($\kappa \geq 0.8$) were not achieved, a third team member was asked to code the transcript. Codes were refined via comparison and discussion, and reorganized into key themes and subthemes until consensus was reached. This analysis phase was repeated until all coding discrepancies were resolved and novel codes no longer emerged (ie, saturation). Novel code emergence and eventual saturation is described below for each theme. Summaries of each code and representative quotes are provided below.

Results

Participant characteristics

The sample was young ($M = 20.78$ years, $SD = 2.36$) and majority male (n = 34, 69.4%). As shown in Table 2, 22 identified as non-Hispanic white, 15 non-Hispanic African American, 4 non-Hispanic Asian, and 2 non-Hispanic multiracial; 6 identified as Hispanic. Approximately half of the participants (n = 25, 51.0%) were students at a 4-year university. Others were community college students (n = 9, 18.4%), graduate students (n = 3, 6.1%), a high school student (n = 1, 2.0%), and nonstudents (n = 11, 22.5%).

Table 2. Sample characteristics (n=49).

	N (%)
Gender	
Male	34 (69.4)
Female	15 (30.6)
Age group, years	
18–20	29 (59.2)
21–24	18 (36.7)
25–28	2 (4.1)
Race/ethnicity	
Non-Hispanic white	22 (44.9)
Non-Hispanic African American/black	15 (30.6)
Non-Hispanic Asian	4 (8.2)
Non-Hispanic multiracial	2 (4.1)
Hispanic	6 (12.2)
Student status	
Nonstudent	11 (22.5)
High school	1 (2.0)
Community college	9 (18.4)
University	25 (51.0)
Graduate school	3 (6.1)
Stratification group	
Nonuser	22 (44.9)
Exclusive e-cigarette vaper	12 (24.5)
Exclusive cigarette smoker	7 (14.3)
Dual user	8 (16.3)

Mean carbon monoxide readings were consistent with self-report of cigarette smoking status (*nonusers* $M=0$ ppm; *vapers* $M=1.5$ ppm, $SD=1.9$; *cigarette smokers* $M=17.5$ ppm, $SD=6.6$; *dual users* $M=11.2$ ppm, $SD=14.1$). The majority of *nonusers* reported never using cigarettes/cigars ($n=17$, 77.3%) or e-cigarettes ($n=16$, 72.3%), with three *nonusers* reporting smoking once or twice (13.6%) and two reporting smoking 10 times (9.1%). Two *nonusers* (9.1%) reported vaping once or twice, one (4.5%) reported vaping 4 times, one (4.5%) reported vaping 20 times, and one (4.5%) reported vaping 30 times. The majority ($n=10$, 83.3%) of the *vapers* reported vaping over 100 times, all ($n=7$, 100.0%) of the *smokers* reported smoking over 100 times, and majorities of the *dual users* reported both vaping ($n=6$, 75.0%) and smoking ($n=6$, 75.0%) over 100 times. The majority ($n=7$, 58.3%) of the *vapers* were ex-smokers (over 50 lifetime cigarettes), but the

remainder ($n=5$, 41.7%) had smoked fewer than 50 lifetime cigarettes. All exclusive *vapers* reported the use of advanced e-cigarette devices (eg, “rebuildable atomizer,” “tank”), rather than first generation “cig-a-likes.” Most *cigarette smokers* ($n=5$, 71.4%) had never established a pattern of e-cigarette use, with estimates of lifetime use ranging from 0 to 30 times. However, the remaining two were “ex-vapers,” having established a pattern of e-cigarette use previously, but without any current use. All *dual users* used e-cigarettes in the week prior to screening and most ($n=7$, 87.5%) were daily e-cigarette users. A minority ($n=3$, 37.5%) used first generation “cig-a-likes,” while most ($n=5$, 62.5%) reported use of more advanced devices (eg, mechanical mod, box mod, tank). Additionally, all *dual users* smoked cigarettes in the past week and three-quarters ($n=6$, 75.0%) were daily cigarette smokers.

Content analysis

Positive Reinforcement: Participants noted various positive effects they felt could arise immediately from e-cigarette use. Initially, we coded only for Sensory Experience and Stimulation / State Enhancement. However, reports of the importance of hand movements (described below) resulted in changing this theme to describe Sensorimotor Experiences. In addition, reports of taste appeared frequently enough to merit its own theme. Thus, Positive Reinforcement effects included Sensorimotor Experience, Taste, and Stimulation.

Numerous sensorimotor experiences were described. See Table 3 for full quotes by group. *Nonusers* noted that “on social media, there are people that like doing like weird tricks” that are “fun to watch.” *Vapers* reported that they liked “seeing the cloud” and that it was “visually satisfying.” *Dual users* noted that some people refer to themselves as “cloud chasers” who “have competitions.”

“I do know a couple of people who do vape who have never smoked a cigarette in their life. Only because you can do tricks and stuff with it. You can have fun with it. The vapor, it is a rather thick vapor – that is the vegetable glycerin doing that – and you can do different things with it. You can blow O’s, you can make tornados.” (Dual user)

We used the term “sensorimotor experience,” rather than simply “sensory experience” to include hand movements. *Nonusers* observed that “everyone today is on their phone” and “when they are not on their phone, [e-cigarette users] have a vape,” so they always have “something to do with their hands.” Indeed, users reported they valued being able to do “something with my hands” and “craved the inhaling” experience that was similar to smoking.

“I’m a twitchy person. I play drums when I was little all the way up, and I have to be doing something with my hands ‘cause I can’t smoke so that really does [help]. . . keeping your hands busy and always constantly doing something.” (E-cigarette vaper)

Table 3. Example quotations within the main theme of Positive Reinforcement.

SUBTHEMES	EXAMPLE QUOTATIONS
Sensorimotor experiences	"I feel like when they are in public – the bigger the puff the more impressive it is to people who would like try doing different things with vape. Like, now on social media, there are people that like doing like weird tricks with their vape smoke or making the biggest puff they could make." (Nonuser)
	"It was like fun to watch this come out of your mouth, like do different things." (Nonuser)
	"I think that also with technology advancements, everyone today is on their phone or need to have something to do with their hands. So when they are not on their phone, they have a vape that you can use in a lot of places. They do that and then go back to use their hands, so they are always engaged." (Nonuser)
	"I like seeing the cloud." (E-cigarette vaper)
	"[The cloud] is visually satisfying." (E-cigarette vaper)
	"I'm a twitchy person. I play drums when I was little all the way up and I have to be doing something with my hands 'cause I can't smoke." (E-cigarette vaper)
	"Just to blow a big cloud. It looks cool though." (Cigarette smoker)
	"I craved the inhaling not as much [NRT] gum." (Dual user)
	"Yeah a lot of people are really into the aesthetics about it. Some people even refer to themselves as cloud chasers trying to blow the biggest cloud as possible. They'll actually have competitions about it." (Dual user)
	"Like these people are blowing massive clouds. It looked like a cumulonimbus cloud going into the sky." (Dual user)
Taste	"He [my friend] has a bubble gum flavor and I like the bubble gum smell. And I'm like, 'That smells really really good. I bet it tastes just like bubble gum.' But then, I'm like, 'I probably shouldn't do it.'" (Nonuser)
	"When you vaping you are doing it for. . .the flavor." (E-cigarette vaper)
	"I mean it would have a taste but not strong enough. That's just how I think. I have no idea." (Cigarette smoker, no prior vaping)
	"It just seems like, I don't know, watery. That's just what I think of. Just nothingness." (Cigarette smoker, no prior vaping)
	"The coils burnt out on me a couple of times and then it tastes like metal. 'Cause it has a coil on the inside like a light bulb. And then when that burns out it tastes like chemicals and metal, copper. It is horrible." (Cigarette smoker, ex-vaper)
	"[E-cigarettes] have nice flavors and they taste nice but sometimes you need that original taste and that hit [from cigarettes]." (Dual user)
	"I like it more just because it is flavored and you can pick your flavor. Yeah. There is a lot more variety with it. A lot more choice." (Dual user)
Stimulation	"I'm not sure if I am correct to say this, but isn't the nicotine itself the thing that kind of gives you the little mental buzz." (Nonuser)
	"Oh yeah, personally I always feel better when I [vape]." (E-cigarette vaper)
	"It just seems like it would be weaker." (Cigarette smoker)
	"Very similar to just a cigarette nicotine buzz or a cigar." (Dual user)

Taste was added as its own category due to repeated mentions, both positive and negative. A nonuser reported curiosity about the flavors.

"He [my friend] has a bubble gum flavor and I like the bubble gum smell. And I'm like, 'That smells really really good. I bet it tastes just like bubble gum.' But then, I'm like, 'I probably shouldn't do it.'" (Nonuser)

A vaper emphasized that you are doing it for "the flavor," but cigarette smokers felt it would not be "strong enough" and would be "watery" or "just nothingness." An ex-vaping smoker also noted issues with "burnt out" coils in the e-cigarette that taste "horrible." Dual users enjoyed the "variety" and "choice," but also

noted that sometimes you needed the "original taste" and "hit" from cigarettes. There was some disagreement, however, about whether the flavor or the nicotine were more important.

"With me, it is more of a flavor thing 'cause I've always smoked Marlboro Reds and I've never had a juice that could replicate that flavor. . . It is kind of an acquired taste after a while. It is just something that a vape can't really achieve. Maybe it'll be easier to replicate as time progresses. . . It's not so much the nicotine thing for me. Just the flavor." (Dual user)

Participants also commented on the Stimulation effects of e-cigarettes, with all groups repeatedly using the term "buzz" to describe the experience, although some cigarette smokers felt

the stimulation would be “weaker.” Users also commented on the ability to modify nicotine dosage.

“I started with a higher level because the average cigarette is somewhere around 32 mg nicotine. You get a really strong buzz. So I went to 12 mg so I would get a little bit of the same feeling but not intense and crazy like it would be.” (Dual user)

Social Benefits: Several positive potential interpersonal benefits were noted by the participants. Initially, these were coded solely as Social Impression and Social Facilitation, but additional themes of Influence on Others and Convenience emerged. Relatively low codes of Social Impression resulted in the abandonment of this theme. Thus, Social Benefits codes included Social Facilitation, Influence on Others, and Convenience. As shown in Table 4, participants noted Social Facilitation as a potential advantage of e-cigarettes, as use had “all the social aspects of smoking,” so that participants could hang “out with friends” who smoke cigarettes and still feel “like you maybe belong.” In addition, users were able to participate in social events related to e-cigarettes. Indeed, some felt vaping was more social than traditional smoking.

“I would say [with vaping] it’s even a bigger social aspect [than smoking] because you have – you don’t have cigarette conventions, you don’t have shops where you go sit down, relax, and smoke. There’s a large social aspect to [vaping] and I think it’s a great thing.” (E-cigarette vaper)

Another social benefit noted was Influence on Others. *Nonusers* reported concerns that e-cigarette use was becoming a trend among youth.

“It’s a danger with the art part of it. You make these rings and they look cool and the kids be like, ‘I want to do that’ but then do it later with a real cigarette maybe.” (Nonuser)

In contrast, *vapers* appeared to enjoy getting others to try the devices, particularly if it could help others quit cigarette smoking. Both *vapers* and dual users reported that others will “try out” their devices “to see what the craze is all about.”

“I’ve had people walk up to me and ask, ‘What this is?’ And I’ve talked to them about it because a lot of people smoke and are trying to get out of it. So I talk to a lot of people who smoke about vaping and they usually walk away pretty satisfied with the conversation.” (E-cigarette vaper)

Convenience also came up as a notable aspect of e-cigarettes. *Nonusers* were concerned e-cigarettes are used more than traditional cigarettes “because it is easier and more convenient.” E-cigarette *vapers* agreed.

“It’s not like a cigarette where you are restricted to certain areas. It’s a lot more accessible and you can use them in a lot more places.” (E-cigarette vaper)

In addition, users appreciated that they can “decide how long you want to do it for instead of the cigarette telling you.”

“So, just to have that convenience of – pull it out, take a puff, and put it back wherever it was – allows you to do whatever you were doing and go about your day and doesn’t really restrict your life.” (Dual user)

On the other hand, cigarette smokers felt that e-cigarette use gets “kind of technical” in terms of maintenance and other issues.

“I think I broke 1 or 2 vape pens and I kept buying them every time. Then the coil went out maybe one time and I just went and bought another \$15 pen and just didn’t want to change it out anymore.” (Cigarette smoker)

Negative Affect Reduction: Initial codes included Negative Affect Reduction, Weight Control (Appetite Reduction), and Boredom Reduction. However, Stress Reduction emerged as the most important aspect of negative affect mentioned in the groups. As shown in Table 5, participants from all groups felt that Stress Reduction was a reason for using e-cigarettes. *Nonusers* reported observing people vape “as a stress reliever” and that users “can’t function properly” without it. Some smokers were skeptical that e-cigarettes could provide adequate relief, but some dual users specifically noted that e-cigarettes could be helpful as an alternative to smoking.

“I had to smoke a cigarette after my exam too. Smoking e-cigarette, I’m not quite sure. I don’t think it would help.” (Cigarette smoker)

“[It] like takes the edge off. In a situation I would smoke a cigarette I would just hit the vape instead. Stressful situations, school which is stress, everything that is stress, I would drive to smoke a cigarette, now I try to lean towards the vape instead.” (Dual user)

The pattern was repeated in relation to Appetite Reduction. *Nonusers* felt that starting one “unhealthy habit” might lead one to start other unhealthy habits. In contrast, a smoker wondered if e-cigarettes would be as effective as tobacco cigarettes.

“It satisfies my hunger, so I’m not really hungry for food because I already chain smoked some cigarettes. But I think if I was to try an e-cigarette my appetite would probably be normal.” (Cigarette smoker)

Dual users disagreed on the effectiveness of vaping for appetite reduction compared to smoking. One reported that either activity “pretty much destroys your appetite.” However, another dual user disagreed.

“Partially. Yes. But then there is another part. I don’t know. It doesn’t do the same thing. For some reason if I smoke a cigarette I feel like I don’t need to eat. I smoke an e-cigarette I feel like, I still am going to go to the kitchen and get that extra slice of pizza. Let’s be real.” (Dual user)

Table 4. Example quotations within the main theme of Social Benefits.

SUBTHEMES	EXAMPLE QUOTATIONS
Social facilitation	"I guess a positive if you are a not a smoker is that you would feel like you maybe belong, like you want to try the cool thing but you don't want to go all the way and smoke an actual cigarette like you might feel cooler if you want to try it." (Nonuser)
	"It still has all the social aspects of smoking, grab all your buddies at work go out and take a smoke break and talk to everyone and everybody gets away from work for a second." (E-cigarette vaper)
	"I do know people who use e-cigarettes when they are out socially. It is all the same. I smoke my cigarettes standing right beside someone that is using their vaporizer." (Cigarette smoker)
	"Like if I go hang out with friends I might have my vape on me instead of cigarettes. Or I go to a vape shop for a few hours to hang out there. You just vape e-cigarettes, stuff like that. But I would never just use cigarettes as social." (Dual user)
Influence on others	"If you see someone [vaping] and you ask what's that, they will say oh you should just try it – more people are just inclined to say oh sure." (Nonuser)
	"Uh yeah. I enjoy it and my friend – they don't do it personally, but anytime I do have my vape with me they always ask for a hit of it." (E-cigarette vaper)
	"I had a buddy of mine who got tired of his mom smoking packs and packs a day. He went out and got her a vape and she used it for 2–3 weeks. He was proud of it. And then he said, 'Yeah, she is back to cigarettes again.'" (Cigarette smoker)
	"Yeah, yeah. Like when I was smoking cigarettes I saw somebody vaping and I was like, that is cool, I want to try it out. I tried it out. I liked it. And then I got one for myself. So I myself was influenced by someone else and I'm sure I've influenced a couple of my friends in getting one themselves." (Dual user)
	"But yes. People who don't usually smoke in my experiences. . . smell the smell of the flavored tobacco and they feel like it is harmless and want to try it out to see what the rave is all about. Like what is this craze all about that these guys just smoking these hookahs and e-cigarettes and blowing these big clouds of smoke out. And I got my cranberry and vodka so let me try this e-cigarette out. It definitely entices people to see what the craze is all about and try it out." (Dual user)
	"I feel like you use it more than you would than a cigarette because it is easier and more convenient." (Nonuser)
Convenience	"So you don't have to go outside when it is cold. It is not like how most people don't like the smell of a cigarette." (Cigarette smoker)
	"[Using an e-cigarette] gets kind of technical while as smoking you just light a cigarette." (Cigarette smoker)
	"And then, I think I broke 1 or 2 vape pens and I kept buying them every time. Then the coil went out maybe one time and I just went and bought another \$15 pen and just didn't want to change it out anymore." (Cigarette smoker)
	"I would say [an e-cigarette] is more convenient as in you don't have this specific length like a cigarette. Like you smoke it all and then you are done. It is like, you know you can just pull it out of your pocket and put it to your mouth and press a button. And it's like, you don't even have to do it for like 5 minutes. You could do it for less or more. It is like, you can decide how long you want to do it for instead of the cigarette telling you." (E-cigarette vaper)
	"But out of convenience because with e-cigs you can use them inside and there is no staining smell like cigs. You don't have to worry about ashes, so it's definitely cut back on cig use but it has not completely negated it yet. Nor do I know if it ever will, it's not out of. . . sometimes I just prefer a cig." (Dual user)

Boredom Reduction responses were similar. *Nonusers* felt this could be a risky way to deal with boredom, indicating that is how "addictions form," but *vapers* felt it would be effective.

"It really does work to cure boredom though. . . I can't smoke so that really does relieve the boredom factor." (E-cigarette vaper)

Cigarette smokers felt vaping would be ineffective to reduce boredom for more than "5–10 minutes," while some dual users felt it may be even more effective than smoking.

"When I am bored yes, e-cigarettes. I don't normally smoke when I am bored but I might have an e-cigarette or a vape, stuff like that." (Dual user)

Negative Consequences: Initial coding included Health Risks. As shown in Table 6, participants noted additional potential negative consequences that could detract from the appeal of e-cigarette use, specifically Addiction and Secondhand Effects. Health Risks were brought up as a concern, although participants expressed uncertainty regarding these risks. *Nonusers* indicated that "inhaling anything" besides "oxygen is not good for you." Similarly, cigarette smokers indicated that "putting chemicals in your body" can never be "that good" and that they "had heard [of] a couple of people getting pneumonia." In contrast, *vapers* reported general uncertainty, but overall felt it would not be problematic if you "know what you are doing" and proper precautions were taken.

Table 5. Example quotations within the main theme of Negative Affect Reduction.

SUBTHEMES	EXAMPLE QUOTATIONS
Stress reduction	“A lot of people use vape and e-cig as a stress reliever. And when they don’t have it, they can’t function properly and their mood completely changes.” (Nonuser)
	“I think that they would only provide relief if you were already tried e-cigarettes – like if you are already kind of dependent on them – then you need that relief too.” (Nonuser)
	“When I am stressed out, or if I am anxious and I start vaping it will help me calm down definitely.” (E-cigarette vaper)
	“I had to smoke a cigarette after my exam too. Smoking e-cigarette, I’m not quite sure. I don’t think it would help.” (Cigarette smoker)
	“If I vape I calm down. . . It just helps me calm down.” (Dual user)
	“[It] like takes the edge off. In a situation I would smoke a cigarette I would just hit the vape instead. Stressful situations, school which is stress, everything that is stress I would drive to smoke a cigarette, now I try to lean towards the vape instead.” (Dual user)
Appetite reduction	“You start an unhealthy habit, you may be less likely to exercise, and. . .be more inclined to go buy fast food.” (Nonuser)
	“It will like distract you from hunger. . . I will be like I have got to go eat something but let me take these few more puffs and keep working.” (E-cigarette vaper)
	“When I smoke it curbs my appetite. Sometimes I feel like it satisfies my hunger so I’m not really hungry for food. . . But I think if I was to try an e-cigarette my appetite would probably be normal.” (Cigarette smoker)
	“It pretty much destroys your appetite. With cigarettes itself, like cigarettes specifically, you get the taste in your mouth that you don’t want to eat anything because everything is going to taste like a cigarette. But with vaping – the nicotine content – it just takes away your appetite. You don’t want to eat anything. I mean I’ve tried eating immediately after a nice little vape session and it just doesn’t work out. I just don’t want to eat.” (Dual user)
	“Partially. Yes. But then there is another part. I don’t know. It doesn’t do the same thing. For some reason f I smoke a cigarette I feel like I don’t need to eat. I smoke an e-cigarette I feel like, I still am going to go to the kitchen and get that extra slice of pizza. Let’s be real.” (Dual user)
Boredom reduction	“I feel like that would have the worst impact like you should never do something, like I know a lot of people do drugs or drink when they are bored but that is actually the worst time to do it in my opinion because every time you get bored you are like, “Oh, this is what I can do’ and that’s how a lot of addictions form.” (Nonuser)
	“And I really got into it and now it’s like, instead of a thing for quitting it is more like a hobby for me.” (E-cigarette vaper)
	“I figure smoking an e-cigarette could maybe un-bore you for about 5–10 minutes. Just with playing with all the vapor that comes out of your mouth, maybe blowing O’s or whatever you like to do with your smoke when you blow it out. But, that is the only thing I could see if you are bored like you still going to be pretty bored.” (Cigarette smoker)
	“When I am bored yes, e-cigarettes. I don’t normally smoke when I am bored but I might have an e-cigarette or a vape, stuff like that.” (Dual user)

“Compared to someone who doesn’t use e-cigs and doesn’t use any tobacco products at all, you’re obviously not going to be as healthy if you do this because you are still inhaling something that you shouldn’t be, right? Like it’s not air, its high density water vapor, so I mean you are still doing something that is ultimately bad for your body even if it’s not as bad or barely bad at all.” (E-cigarette vaper)

Dual users generally reported that e-cigarettes were much safer than traditional, combustible cigarettes.

“For the 2 years I’ve been doing it, I’ve seen a big difference in my own health in a way. When I started vaping, it was just a thing that I did and I still smoked a pack a day at that point. . . After I finally took the initiative to make it my go-to instead of a go-to cigarette – sometimes it is this [vaping device] and cigarettes sometimes – I’ve seen a difference in my health in a different way where lung function and everything about that [had an] effect. Positive effect.” (Dual user)

Another concern reported was the possibility of Addiction. *Nonusers* indicated concerns that use could lead to neglecting responsibilities and worried about “the addictive effects and the withdrawals when you stop using it.”

“You [are] probably spending more money on doing these things and taking time away. And if you are our age, it’s taking time away – you guys know – it’s taking time away from homework, your social life, things like that.” (Nonuser)

Some *vapers* and dual users also reported addiction concerns.

“It is also kind of a dependence thing. Like once you start it you aren’t going to want to stop it because you are going to feel awful. And it is a lot based off of the individual. Some people are more addictive than others.” (Dual user)

Table 6. Example quotations within the main theme of Negative Consequences.

SUBTHEMES	EXAMPLE QUOTATIONS
Health risks	"Inhaling anything. . .that is not oxygen is not good for you." (Nonuser)
	"It can be dangerous if you don't know what you are doing." (E-cigarette vaper)
	"They just started like testing the effects. So it is really relatively unknown what happens to you [from e-cigarette use] like decades down the line. I don't expect there to be like a huge problem. But it is definitely something I would like to know about." (E-cigarette vaper)
	"Because e-cigarettes, you are still putting chemicals in your body, so I don't think it can ever be that good." (Cigarette smoker)
	"I had heard a couple of people getting pneumonia." (Cigarette smoker)
Addiction	"Vaping doesn't have the same effect because it isn't tobacco. It's actually the burning of tobacco that has that effect on the nicotine." (Dual user)
	"Like I just see people like she said, again, spazz out because they can't find their vape and they won't leave their situation until that vape is found." (Nonuser)
	"You are still going to get the addictive effects and the withdrawals when you stop using it." (Nonuser)
	"Yeah. Like you kind of can't go on throughout your day unless you have it. Else you feel kind of off. Like I don't feel myself if I don't." (E-cigarette vaper)
	"As I've started going down my levels of nicotine, I don't need it as much. Before I left every day, I made sure I had it at the start. I still have it on me pretty much daily, but if I do forget it it's not like I got to go back home. It's not something I'm dependent on." (E-cigarette vaper)
	"I think at this point I'm more addicted to the hobby rather than addicted to the nicotine." (E-cigarette vaper)
	"I probably would just want to turn to a real cigarette over time. If I am really addicted to an e-cigarette." (Cigarette smoker)
	"It is just something to do. It is just, I mean for me, personally it has become more of a hobby more than an addiction." (Dual user)
	"For me it has become a quitting smoking aid and has been very effective – from a pack a day to a pack a week." (Dual user)
	Secondhand effects
"They smoke [e-cigarettes] and it smells really good. . . I don't mind being around it because it doesn't smell bad but where cigarette smoke I just walk by it and it smells bad and gross." (Nonuser)	
"I guess another positive of the e-cig is that when you light it, like when you smoke you are putting pollution in the air. It's not the same effect if you use a vapor pen. You are not lighting anything I would assume." (Nonuser)	
"I actually laugh at people that say you are going to get secondhand smoke; it's water vapor. But it does have different added things other than water." (E-cigarette vaper)	
"I don't know if e-cigarettes give off secondhand smoke or not, but that is something I've thought about." (Cigarette smoker)	
"It's electronic so you aren't really smoking in the bar. I don't know if you are contributing to global warming as much so there is an environmental [impact]." (Cigarette smoker)	
"That is what it is supposed to be is vapor with nicotine in it. But I think the one thing is that you can't really bother people with secondhand smoke. They aren't worried about secondhand vape; they are worried about secondhand smoke." (Dual user)	

However, many denied they were addicted to vaping. Some users regarded vaping as a "hobby," rather than attributing use to nicotine addiction.

"I definitely do it every day but I feel like I could stop if I really wanted to, you know." (E-cigarette vaper)

Dual users reported beliefs that e-cigarettes can help them quit their combustible cigarette addiction with some reporting wanting to quit nicotine entirely.

"My long term effect is hopefully going to be quitting cigarettes and it has been working so far and I hope to be done by the time I'm out of school." (Dual user)

"When you have that craving – now I'm craving my vape – I just want a little bit of nicotine. I don't want all that nicotine that a cigarette is going to give me all the time now. So stepping down to 0 is going to be [my goal]." (Dual user)

Secondhand Effects came up as a novel concern. *Nonusers* indicated annoyance and concern regarding secondhand effects

of e-cigarette aerosol, although some reported that e-cigarette aerosol “smells better” than cigarette smoke.

“But now like because the e-cigarettes are flavored, I don’t mind breathing walking by breathing it in though. But now I kind of want to research it, ‘cause can it cause something in the long term?” (Nonuser)

Vapers and dual users generally reported beliefs of no or minimal secondhand effects from vaping.

“There aren’t any chemicals to be thrown back at anybody. It is just – the only harmful thing that is in it is nicotine if you choose to use it. And you take that up when you inhale it.” (E-cigarette vaper)

Discussion

Studies examining e-cigarette expectancies over the past few years have used measures modified from existing cigarette smoking expectancy questionnaires.^{26–31} The extent to which items from these measures are relevant to e-cigarette use, particularly among young adults, was uncertain. To address this concern, we conducted focus groups and individual interviews with groups of young adults stratified by e-cigarette use and cigarette smoking. Consistent with theory and survey-based research,^{23,26,28,31} *vapers* and dual users reported many benefits of e-cigarette use, whereas *nonusers* and exclusive cigarette smokers indicated overall skepticism. Some domains previously found to be relevant for cigarette smoking were again mentioned here as relevant for vaping, including the overall themes of Positive Reinforcement, Social Benefits, Negative Affect Reduction, and Negative Consequences.^{23,43,44} Important potential refinements and novel subthemes were identified for future research.

Positive Reinforcement refers to the various rewarding effects associated with acute drug use.⁴³ Participants indicated the importance of some of these immediate outcomes, including clouds, hand movements similar to smoking, the tastes of different flavors, and stimulation (“buzz”). There was particular emphasis placed on some experiences novel to e-cigarettes, such as vaping tricks, unique flavors, and various levels of nicotine. Vaping tricks appear particularly influential, given their ability to be posted on social media and be a source of competitive activity.

Social benefits were also noted as important, particularly being able to spend time with friends who smoke cigarettes, as well as visit vape shops and go to e-cigarette conventions. Participants noted “influence on others,” that is, a belief that others who see one vaping might be intrigued by it, as a potential benefit/concern. The importance of this issue may be related to the rapid growth of e-cigarette use over the past decade and the increased value of social connection among this cohort. As noted by other researchers, perception of increased social standing is an important component of e-cigarette use, both among young adults^{28,36} and among adults in general.²⁸ “Convenience” was noted as another important construct. This is consistent with positive e-cigarette expectancies identified via concept

mapping.⁵⁰ Although convenience is not an outcome expectancy per se (because it is not a belief regarding the consequences of vaping), beliefs about issues such as convenience and cost may nevertheless be important drivers of substance use behavior. For example, prior research examining a convenience belief measure among e-cigarette users with a history of cigarette smoking found that, unlike other positive beliefs, convenience was not associated with decreased rates of cigarette smoking.²⁹ Instead, that study found a trend towards *higher* rates of continued smoking, perhaps suggesting e-cigarette use allows the “convenient” maintenance of nicotine addiction in locations where cigarette smoking is prohibited. On the other hand, participants also noted that e-cigarette use can be more complicated than cigarette smoking and this may discourage individuals from initiating or continuing e-cigarette use.

Negative affect reduction was noted in relation to stress and other unpleasant emotions, unwanted food cravings, and boredom reduction. Notably, these patterns differed by user group. *Nonusers* generally expressed concern about vaping as a coping strategy. Exclusive *vapers* tended to be most positive in their endorsement of e-cigarettes to fill these needs, while cigarette smokers tended to be skeptical. Dual users reported viewing vaping as a tool to avoid smoking, albeit one that was typically inferior to smoking. An exception to this was boredom reduction, where vaping was seen as a more interesting activity than cigarette smoking.

Finally, a number of negative consequences were brought up, including health risks, addiction, and the novel concern of secondhand effects. There was general uncertainty noted regarding potential health risks, although *nonusers* and cigarette smokers seemed to agree there must be some negative health effects. One cigarette smoker mentioned the potential for pneumonia, an unproven consequence unique to e-cigarettes.^{51,52} *Vapers* and dual users tended to be more positive, believing health risks to be minimal if handled properly and certainly much less than smoking. Secondhand effects were also reported as a concern. Most smoking expectancy measures were created before the Surgeon General’s report on secondhand effects of smoking.⁵³ Dangers associated with secondhand effects of either smoke or aerosol are now much more widely appreciated, which may explain why this issue emerged as a new concern. Again, these young adults were uncertain about possible effects from e-cigarette aerosol, but generally thought it was much less risky, and better smelling, than cigarette smoke.

Overall, the findings indicated some overlap between e-cigarette vaping and cigarette smoking expectancies, but also revealed some areas that may be missing and should be studied further. Cigarette smoking expectancy measures have a long history in research related to understanding initiation, dependence, and treatment of cigarette smoking.⁵⁴ Research on e-cigarette vaping expectancy measures to date suggest they can similarly be helpful.^{28,29,55} The present findings support the relevance of prior literature and add to our understanding of similarities and differences between smoking and vaping expectancy measures, particularly the differences by user group among a young adult population.

Limitations

There are some limitations to this study that should be noted. An important limitation is the difference in the sizes of each group, which may have biased the results and categories that were coded. Future studies may consider different inclusion criteria. Data collection involved two interviews in addition to the focus groups. This allowed for more of a perspective from the relatively rare and likely more risky group of dual users.^{41,42} However, interviews may yield different content than focus groups. Focus groups allow for interaction data resulting from participants questioning one another and commenting on each other's experiences, but also creates social contexts that may result in concealment of certain information. Interviews, on the other hand, avoid both the advantages and disadvantages of focus groups. Combining these two types can allow for confirmation across data collection techniques and enhancement of the richness of the data, but the potentially divergent epistemological assumptions inherent to the two methods need to be considered.⁵⁶ Future research may consider including larger numbers of both interviews and focus groups to help address how information obtained varies by type in relation to this issue.

Our relatively small sample is unlikely to be representative of the population as a whole. However, the purpose of this study was the identification of themes for further field testing. Tests with larger groups will help assess generalizability. Further, although a strength of this study is the inclusion of young adults from diverse racial, ethnic, and education backgrounds with a variety of different patterns of cigarette smoking and e-cigarette use, there were some limitations in participant diversity. First, the sample was majority male. Although this is similar to e-cigarette users in the general population,^{15,57} it should be noted that female e-cigarette users and smokers may have different attitudes.^{58,59} Our inclusion criteria defined dual users as past-week use of both substances, unlike other studies that defined dual use based on past-month usage.^{41,42} For this qualitative study, we preferred past-week use so that participants could easily recall their experiences and provide a detailed and accurate responses to the prompts. In addition, nondaily users were excluded. These decisions may have resulted in a relatively smaller, more experienced groups due to their more recent use of both substances and daily use of at least one substance. On the other hand, use and nonuse were defined in part using the demarcation of 50 lifetime use occasions, rather than the 100 cigarettes criteria sometimes used.^{60,61} Few participants in this study used between 50 and 100 times, but they nonetheless may differ from other classifications. These may be worthwhile subpopulations to evaluate in future research. Finally, data collection was conducted before the advent of widespread "pod mod" and Juul use,⁶² which should be investigated in subsequent studies.

Implications

A variety of interventions to discourage uptake of e-cigarettes among nonsmoking youth, and perhaps, if justified, to

encourage smokers to switch to e-cigarettes, are possible. These could include marketing regulations, labeling requirements, and counter-messaging development. Success of these techniques will be enhanced by a clear and compelling research base involving relevant constructs, such as expectancies. Field testing and further refinement of these e-cigarette expectancy themes and associated items will provide critical data on young adults' likelihood to engage in this rapidly increasing behavior, as well as a tool to enhance research, clinical, and public health efforts. Examining expectancies and other constructs in more detail can aid in providing a fuller picture of e-cigarette beliefs and, thus, more informed targets for intervention.

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Author contributions

PTH led the manuscript writing and revision process and the interpretation and synthesis of transcripts, with input from THB, KJE, TEB, LOB, VNS, and GPQ. THB provided project mentorship. GPQ provided qualitative expertise consultation. LOB assisted with revisions. All authors read and approved the final manuscript."

Human Subjects Statement

This study was approved by the Eastern Virginia Medical School IRB.

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