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Youth perspectives on concurrent smoking and vaping: Implications for tobacco control

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Youth perspectives on concurrent smoking and vaping: Implications for tobacco control

Abstract (222 words)

Most people who smoke cigarettes begin young. Consequently, public health efforts directed at youth are a priority. The increasing popularity of electronic nicotine delivery systems (ENDS) among youth in the United States has raised concerns in the public health community about the potential of ENDS to renormalize cigarette smoking and perpetuate nicotine addiction, creating dual users who both vape and smoke. Despite limited and inconclusive evidence about dual use for young people, restrictive approaches towards ENDS have shaped tobacco control agendas in the United States. Based on analysis of 26 interviews with young dual users in California, we explored the meanings young people ascribe to their dual using practices and how those meanings relate to the broader tobacco control environment which structures their lives. Results suggest that dual users of ENDS and cigarettes overwhelmingly perceive a utilitarian meaning of dual use and view vaping as a tool for reducing smoking-related harm in the near term and facilitating quitting smoking in the long term. Also, participants' narratives related to Tobacco 21 laws, which prohibit sales of both ENDS and cigarettes to individuals under 21 years of age, revealed concerns about restrictive policies that limit access to less harmful tobacco products. Results of this study raise important questions about whether we are working towards further reductions in the prevalence of smoking and tobacco-related diseases.

Key words: tobacco policy, smoking, vaping, youth, harm reduction

Introduction

Most people who smoke cigarettes begin during adolescence or in young adulthood, and early smoking initiation is associated with a progression to daily smoking, heavier smoking, and long-term nicotine dependence, and a greater difficulty with smoking cessation (Bernat, Klein, & Forster, 2012; Mayhew, Flay, & Mott, 2000; US Department of Health and Human Services, 2012). For example, in California, 63% of adults who smoke began by the time they were 18 years old (California Department of Public Health, 2015). To prevent early smoking initiation, public health efforts directed at youth are seen as a priority in tobacco control and prevention (US Department of Health and Human Services, 2012; Wellman et al., 2016). The increasing popularity of electronic nicotine delivery systems (ENDS) among youth in the United States has raised concerns in the public health community about the potential of ENDS to renormalize cigarette smoking and perpetuate nicotine addiction, and therefore, tobacco control and prevention efforts largely consider ENDS to be a “significant public health concern” (California Department of Public Health, California Tobacco Control Program, 2015, p. 3; Department of Health and Human Services, 2016).

In light of these concerns, the state of California implemented new laws in 2016 to regulate the use and sale of ENDS. Specifically, these new laws restrict vaping in all places where smoking is prohibited (Smoke-free Air laws) and raise the legal age for purchasing all nicotine and tobacco products from 18 to 21 years old (Tobacco 21). In this new tobacco control environment, all nicotine and tobacco products, regardless of their varying levels of health risks, are similarly restricted. Though ENDS are considered less harmful than combustible tobacco products (Abrams et al., 2018; Kozlowski & Warner, 2017), their inclusion in these new laws is due in part to concerns that ENDS do not lead to smoking cessation but

instead create dual users of tobacco products (Department of Health and Human Services, 2016; Glantz & Bareham, 2018; Soneji et al., 2017).

Dual use refers to practices of nicotine and tobacco use which include both vaping and smoking. Dual use is common among youth who use tobacco products, and despite conflicting empirical evidence, concerns about its practice among youth and young adults are well documented (Azagba, 2018; Collins et al., 2017; Goniewicz et al., 2016; McCabe, West, Veliz, & Boyd, 2017; Pokhrel, Herzog, Muranaka, Regmi, & Fagan, 2015; Villanti, Pearson, et al., 2017; Wills, Knight, Williams, Pagano, & Sargent, 2015). A growing number of studies have detailed the prevalence of dual use among various groups of youth and compared dual users to other tobacco product users (e.g. cigarette-only, e-cigarette-only) on risk and protective factors, smoking frequency, smoking quit intentions and attempts, and demographic characteristics (Barrington-Trimis et al., 2015; Cooper, Case, Loukas, Creamer, & Perry, 2016; Demissie, Everett Jones, Clayton, & King, 2017; Doran et al., 2017; Goniewicz et al., 2016; Hanewinkel & Isensee, 2015; Huang et al., 2016; Jeon et al., 2016; Kristjansson, Mann, & Sigfusdottir, 2015; Lee, Grana, & Glantz, 2014; Lee et al., 2018; McCabe et al., 2017; Noland et al., 2018; Park, Lee, & Min, 2017; Piper, Baker, Benowitz, Kobinsky, & Jorenby, 2018; Simonavicius, McNeill, Arnott, & Brose, 2017; Wills et al., 2015). Overall, these studies suggest that dual use poses a risk to young people, including inhibiting smoking cessation and perpetuating nicotine addiction.

However, a few recent studies investigating the relationship between ENDS and smoking reduction/cessation among youth, suggest an alternative perspective of youth's dual using practices. For example, Chen and colleagues (2018), in a study of Taiwanese adolescent smokers, found that current vaping was positively associated with attempts to quit smoking. Likewise, a recent longitudinal study of young adults in Texas, found that young smokers who reported vaping for smoking cessation were significantly less likely to be smoking at follow up compared to youth who reported vaping for other reasons, suggesting that youth who vape are not a homogenous group and that long-term nicotine and tobacco use patterns are conditioned by how youth make sense of vaping in their everyday lives (Mantey,

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Cooper, Loukas, & Perry, 2017). In a time series analysis of data on vaping and smoking among youth and young adults in the United States through 2017, Levy and colleagues (2018) found that increases in youth vaping are correlated with “accelerated reductions in youth and young adult smoking prevalence” (pg 6). Together, these findings suggest that vaping may be associated with reductions in combustible tobacco product use among youth and young adults.

In light of conflicting quantitative evidence related to dual use among young people, little is known about how youth themselves make sense of their own dual using practices (Romijnders, van Osch, de Vries, & Talhout, 2018). Qualitative studies of dual use among youth and young adults are rare. Pokhrel and colleagues (2015) were among the first to examine dual use from the perspectives of young people, specifically focusing on the contexts that shape when young participants in Hawaii vape (e.g. managing personal and external smoking restrictions, when tobacco is unavailable) versus smoke (e.g. strong nicotine craving, socializing with smokers, managing other substances). Vandrevala and colleagues (2017) conducted interviews with 20 dual users in England, 70% of whom were between the ages of 18-25, to understand what factors contribute to dual users’ decisions to vape and how dual users evaluate smoking versus vaping. Analyses identified a number of personal and social factors, including vaping to reduce the harms of smoking, to minimize smoking costs, and to circumvent smoking restrictions. Finally, though not explicitly focused on dual users, Hoek and colleagues (2017) conducted a focus group study with 16 young ENDS users in New Zealand, 10 of whom also smoked cigarettes. Examining participants’ expectations of vaping, their analysis suggested that dual users may find vaping unsatisfying because they long for important “elemental attributes” of smoking, like fire or the ephemeral quality of a cigarette (pg 7).

Despite these pioneering studies documenting young dual users’ negotiations, motivations, and expectations of vaping and smoking, research has yet to explicitly consider the meaning of dual use from the perspectives of young people. For some researchers and public health professionals, the fact that young people are using ENDS at all is justification for adopting strict tobacco control policies that regulate all nicotine and tobacco equally (Saitta, Ferro, & Polosa, 2014). In light of emerging evidence that vaping may

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be correlated with reductions in youth smoking prevalence (Levy et al., 2018) and that reducing/quitting smoking may be an important motivation for vaping among young smokers (Abrams et al., 2018; Villanti, Johnson, et al., 2017), it is important to understand the meaning young people ascribe to their dual using practices and how those meanings relate to the broader tobacco control environment which structures their lives. As such, we sought to investigate how young dual users in California, whose lives are structured by a tobacco control environment with restrictive policies towards vaping, make sense of their dual using practices and perceive of the tobacco laws which govern their behaviors.

Methods

As part of the project *Electronic Nicotine Delivery Systems and California Youth*, funded by the California Tobacco-Related Disease Research Program (grant # 24RT-0019), we conducted 52 in-depth qualitative interviews with young people between the ages of 15-25 in the San Francisco Bay Area to examine the meaning, role, and practices of nicotine and tobacco use for youth and young adults. Participants were recruited on the street, through online social media advertising, and by referral. To be eligible for the study volunteers had to (1) be between the ages of 15-25, (2) reside in the San Francisco Bay Area, and (3) report previous experiences with vaping. All participants provided signed consent to participate in the research and received a \$50 honorarium in appreciation for their time. Study procedures were approved by the Pacific Institute for Research and Evaluation's Institutional Review Board.

Using an in-depth, open-ended interview guide, we examined topics related to the participant's personal background and history of nicotine and tobacco use, pathway into and current practices of vaping and smoking, perceptions of vaping and smoking, and beliefs about tobacco control policies restricting vaping and smoking for youth and young adults. We also included a brief questionnaire to measure demographic characteristics and smoking and vaping prevalence and frequencies. Interviews lasted approximately two hours. All interviews were digitally recorded, professionally transcribed, and integrated with ATLAS.ti, a qualitative data management software program, to facilitate qualitative coding and analysis. Research staff coded all interview transcripts to isolate narratives by topic into manageable

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analytical segments. The codelist was developed by the entire research team and informed by existing literature on vaping among youth as well as topics emergent from preliminary analysis of the data. Codes were extensive and included perceptions of smoking and vaping, dual use, initiation stories, social motivations of use, cessation, tobacco policy restrictions, future intentions of use, and social contexts of use.

Descriptive analysis of a brief closed-ended questionnaire that accompanied open-ended interviews suggests that of the 33 participants in the study who reported vaping in the past 30 days, the majority (n=26) were dual users of ENDS and cigarettes. These participants' transcripts were then isolated to structure analysis of the coded narrative data for exploring the meaning of dual use in these youths' lives and how those meanings relate to the broader tobacco control environment in California. Using a pattern-level approach, we organized related quotation segments from participants' narratives into higher-order themes that established the foundation for depicting a portrait of dual use for youth in California (LeCompte & Schensul, 2013). We paid close attention to divergent patterns across participants and conflicting discourses within each interview to identify themes as well as reduce threats to the valid interpretation of the data (Antin, Constantine, & Hunt, 2015). Quotations, identified by pseudonyms selected by the participants, are provided below to illustrate emergent themes.¹

Results

Sample

The average age of participants was 21 years old, with approximately half of the sample between 16-20 years old. Half of participants identified as women, 6 participants (~23%) identified their sexuality as something other than heterosexual, and about 85% of the sample identified as a racial or ethnic minority. Using health care access as one factor to assess socio-economic status, 40% of the 20 participants who were willing to share or knew their health insurance status reported receiving government-assisted healthcare for

¹ Some quotations are introduced below without pseudonyms because participants neglected to provide one.

low-income individuals or were uninsured. The descriptive detail provided here illustrates the diversity of participants, particularly in terms of identifying the multiple disadvantages reported by youth in this study. Notably, this is not surprising due to the social gradient in smoking that is well established in the literature (Bell, McCullough, Salmon, & Bell, 2010).

Utilitarian Meaning of Dual Use: Smoking Reduction/Cessation

Though dual users described various reasons and justifications when asked about vaping specifically, analysis their narratives overwhelming highlighted the utilitarian² meaning they ascribed to the practice of dual use. Though dual use may be considered excessive from a public health perspective because it is believed to be risky, dual users in our study articulated the opposite—that vaping alongside of their smoking helped to move them towards smoking reduction and/or cessation. For example, Z, a 20-year-old dual user who started smoking at the age of 15, always felt that cigarettes were bad for her and so, around 17 or 18, she picked up vaping because she heard it was healthier.

[Vaping] was a little bit of a conscious decision. I wanted to lower the amount of nicotine I was getting daily. I tried [to quit smoking] cold turkey before. I couldn't do it. It was just way too hard...So...I tried the e-cigarettes and the vapes. And I was 'well, this isn't that bad'. It was more customizable...flavors and you can control the nicotine levels. So 'okay, I like this'. Yeah, I mean, of course, I still like cigarettes once in a while. But it's just something about the vape that I keep coming back to... I mostly kind of sort of moved away from the traditional cigarettes. Like I still buy a pack every now and then, but I don't go through them as fast as I used to...I still get the craving, but I'm more likely to reach for my vape versus a cigarette.

² Defined as early as 1824 in philosophical writings, utility speaks to “that property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness...or (what comes to the same thing) to prevent the happening of mischief, pain, evil, or unhappiness to the party whose interest is considered” (Bentham & Mill, 2004; Pawlett, 1997, p. 94).

For Z, like other dual users in our study, enjoying the vape was important for sustaining vaping, which is consistent with notions of utility in that the benefits and advantages that dual users associate with vaping are also complemented by pleasure. As Abrams and colleagues (2018) argue, “Ideally, less harmful [nicotine] products must be sufficiently appealing” to effectively encourage people to transition away from smoking. Narratives from dual users in our study highlight the pleasure they get from smoking (while also acknowledging concerns about smoking-related harms) and, when describing their vaping, commented on the extent to which vaping could replace or at least approach that pleasure. For example, Karol, a 25-year-old dual user who started smoking at 14, felt that vaping gave her the “courage to quit” smoking and that she “could vape all day.” She described how vaping made her feel:

It feels good...it just makes you feel rejuvenated...I can't really explain it...I don't know if you can know the feeling. Relaxing...Like you know when you get a massage. And after you're done getting a massage, you just got that 'ahhh' feeling, that relaxed feeling. It's kind of like that.

Discussions of pleasure in nicotine and tobacco research are rare, yet as Cox and Jakes (2017) argue, pleasure is arguably “one of the key reasons [vaping] has been adopted as a harm reduction tool” (pg 85). Jeff, an 18-year-old dual user who started vaping at 14 also discussed the pleasure he experienced from vaping (i.e. “the soothing effect”) but felt that vaping could not entirely replace the “soothing” and “powerful” appeal of smoking. Nevertheless, he emphasized how strategically integrating vaping helps him to transition away from smoking:

[Vaping is] the closest thing to smoking, without actually smoking... if someone is just trying to quit smoking, what they usually do is go to vaping. And then, they can choose their own nicotine level, ...like start at a higher level. Because normal cigarettes are only 24 milligrams to 18 milligrams. But since that's just like a small hit, like that would become six milligrams in a vape like this, just because it's a lot more powerful. But yeah, they would slowly start out at six, and then maybe three, and then slowly get to zero. Then from there, they can probably just quit, just because they've lost that addiction I guess...I used to vape 12 milligrams. Now, I'm at three...

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These findings are similar to those of Robertson and colleagues (2018) who investigated dual use among adults in New Zealand. Specifically, they found that though vaping was originally intended for smoking cessation among some of their participants, vaping “failed to meet their expectations” and therefore goals to eliminate smoking shifted into goals to reduce smoking (Robertson et al., 2018, p. 2). Young dual users in our study were generally more positive about vaping as a suitable replacement for smoking, but like Robertson’s participants, they similarly perceived the reduction in smoking that vaping facilitated to be valuable on the pathway towards eventual smoking cessation.

For many participants, dual use, as way to transition to smoking cessation, was important because quitting “cold turkey” had not worked for them. Similarly, Keane and colleagues (2016), in their study of adult vapers in Australia, found that participants saw vaping as helpful for reducing or quitting smoking, where quitting smoking was characterized as a “refractory problem that [participants] had previously understood as an individual failure of will” (pg 5). Waffles, a 21-year-old dual user in our study, who began smoking at the age of 14, had always associated vaping with “hipster scum,” described as people from a “higher class trying to emulate a lower class” and so she was not interested in vaping. However, after trying vaping for social reasons, she too eventually adopted the practice for smoking cessation.

I've been trying to quit [smoking]. I'm trying to transition through an e-cigarette. Because I wasn't one of those people who could quit cold turkey, which I tried a lot of times, but it didn't really work for me. So everyone is 'yeah, you should try smoking with an e-cigarette' ...you still get the feeling like you're smoking, but it's easier to quit than smoking cigarettes. So I think that's later on what [vaping] became for me.

Participants, like Waffles and Z, who emphasized dual use as a way to accommodate their inability to quit smoking “cold turkey”, often described how smoking helped to alleviate the stress in their everyday lives. For example, Panda, an 18-year-old dual user, began smoking at 15 to help manage stress and started vaping at 17 when she became concerned about the effects of smoking on her body.

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Since I did smoke often, a lot of people told me just to vape instead which showed me that I am able to lessen my intake on smoking...I wanted to be able to quit smoking, but I wasn't capable...a lot of my friends showed me vaping, and that really changed my point of view, because it did help me with my stress level. And it showed me that I don't have to smoke as much as I did. Because vaping just lowered my intake on nicotine. And at the same time, still had enough nicotine.

The salience of stress among young people who use nicotine and tobacco should not be underestimated in tobacco prevention and treatment. Because young people experience meaningful short-term benefits from smoking (like anxiety reduction), they may fear losing those benefits should they quit. As such, some young dual users may attempt to balance concerns about future physical health (e.g. lung cancer) with concerns about present mental health (i.e. managing stress). Such attempts emphasize the ability of young people to approach their substance use as rational actors. While critical studies of youthful substance use have argued for an increased awareness of young people as rational actors, much of the literature still views them as passive, misguided, and irrational actors in need of protection (Ettorre & Miles, 2002; Lupton & Tulloch, 1998).

Identified in other qualitative studies of vapers [e.g. (Farrimond, 2017; McDonald & Ling, 2015; McKeganey, Barnard, & Russell, 2018; Measham, O'Brien, & Turnbull, 2016; Pokhrel, Herzog, Muranaka, & Fagan, 2015; Yule & Tinson, 2017)], the narratives of dual users in this study similarly described the pleasure, sociability, and status gains or losses associated with vaping. However, most striking from the narratives of young dual users in our study was the overarching, utilitarian meaning they ascribed to the practice of dual use, that is as a way to achieve smoking reduction and cessation. Though some participants generally did not feel that vaping entirely mimicked smoking, it was nevertheless considered “the next best thing.”

Ambivalence about nicotine and tobacco regulations

Participants' narratives about the utility of dual use for smoking reduction and cessation are situated within a broader tobacco control environment. The state of California is considered a leader in U.S. tobacco control with comprehensive strategies designed "to create an environment in which tobacco use becomes less desirable, less acceptable, and less accessible" (California Department of Health Services, 1998). This is accomplished in multiple ways but especially through social denormalization efforts which include limiting where smoking and vaping may take place, how and to whom nicotine and tobacco products may be sold and advertised, and informing the public about the dangers of secondhand smoke and vapor (Lavack, 1999). Given the incongruity between meanings of dual use for participants and a tobacco control narrative that considers any nicotine and tobacco use as excessive and risky (MacGregor 2017), perhaps it is not surprising that ambivalence regarding prominent tobacco control regulations emerged as a particularly salient theme among participants.

Smoke-free Air laws

Dual users, many of whom held negative perceptions about cigarette smoking, generally agreed with smoke-free air laws designed to protect people from second-hand cigarette smoke. For example, Ray, a 19-year-old dual user who started smoking at age 12 and feels like "cigarettes are literally the worst thing...that people can buy" explained:

I'd always like be outside smoking. So I never tried to smoke in a building or anything like that just because I wouldn't even want to be in that air after a while...There's some places where you just should not smoke because other people don't have to be taking in your secondhand smoke. They shouldn't be forced to breathe in. So I think the [smoke-free laws] that are around now are pretty good.

When asked explicitly about vaping's inclusion in smoke-free air laws, some variation in perspective emerged. For many participants, uncertainty about the safety of vaping contributed to support for smoke-

free laws that included vaping. For example, Necee, a 24-year-old dual user who prefers smoking but feels that her vaping device is “giving me enough” to “prove its worth,” said:

I think that until somebody proves that [vaping's] not harmful to anyone or anything, that those restrictions are absolutely correct. Because just like smoking cigarettes, you know what's going to happen if you smoke a cigarette next to somebody else who doesn't smoke, or even if they do smoke, you know the effects of that. But vaping is so new and there's so little research, I mean there's probably tons of research but there's none that's come out and said 'oh, for sure, for sure, this is safe and it's not going to harm anyone or anything.' So to be careful and to protect everyone, I feel like those laws are great.

Like Necee, other participants often expressed wanting to protect others from their own smoking and vaping, typically with respect to concerns about second hand smoke or, less frequently, vapor or to concerns about the effects of using nicotine and tobacco around children. Despite these narratives of altruism, however, a few participants did raise questions about the relatively recent inclusion of vaping in smoke-free air laws. A 25-year-old dual user, CeCe, who feels like her ability to “control” her vaping more than her smoking ultimately helps her to pursue goals of quitting smoking, admitted:

I think I'm a little bitter about the vaping rules, more than I am of smoking rules...Like 'oh my God, if you were vaping here, you know, like vaping is not allowed'. But it's not harming anyone. At least, I don't think it is. ...it's not making anyone stink. I don't smell bad. No one else is smelling bad. You're just blowing out some vapor that smells good. So yeah, it's just frustrating that people look at it as something so terrible when it's actually helping people quit smoking.

Due to evidence suggesting that second hand vapor does not include “exposure to contaminants that would warrant health concerns” (Burstyn, 2014; Saitta, Chowdhury, Ferro, Nalis, & Polosa, 2017; Saitta et al., 2014, p. 57), Saitta and colleagues (2014) have argued that permitting vaping in places where smoking is prohibited may in fact support adoption of vaping and eventual smoking cessation, a perspective highlighted

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in CeCe's narrative above. Nevertheless, despite some variation in perspective among our participants about the inclusion of vaping in smoke-free air laws, dual users generally expressed dispassionate support for these laws.

Tobacco 21 laws

Participants' narratives related to Tobacco 21 laws revealed more controversy. Data collection for our study took place during a time when support for raising the minimum legal purchase age on nicotine and tobacco from 18 to 21 had gained momentum in California, and in the middle of data collection, California became the second state in the United States to implement Tobacco 21 laws. Even though not all interviews for the study were conducted after the implementation of T21, participants expressed more concerns about these tobacco control efforts, suggesting a conflict between meanings of dual use for some participants and the structures shaping their everyday lives. When asked about how he feels about new Tobacco 21 laws that include vaping, a 22-year-old dual user who vapes to allow himself to smoke less often, responded by saying:

That I don't like...Tobacco, if it's 21, I see that point. ...let's say if some 18-year-old or 19-year-old was on cigarettes, right, and they need a fix of [nicotine], they need to try and get off of [smoking], but they can't and they want to resort to something else, but ... they can't do it because they're restricted to 21. They either have to ask someone to buy it for them, or they had to completely tell themselves to go cold turkey and then try to fight through it. Yeah, I don't see the point of restricting [vaping] out to 21. They should have restricted it to 18...to help others to get off of [smoking]...I think there should be different laws for vaping and smoking. Because obviously, smoking cause more harm than vaping. ...Because vaping, people see it as a way to get off smoking cigarettes.

A similar sentiment was echoed by a 16-year-old dual user who feels vaping is prohibitively expensive yet wants to switch to vaping because “vaping is way safer than smoking stogs” and he does not want to get lung cancer. He said:

I think [Tobacco 21] is stupid. ... I mean, if [vaping's] way healthier than smoking stogs, why is it 21? I feel like tobacco is 21 because they don't want a lot of people dying. And vaping is alright, so there shouldn't be an age limit.

Given that dual use signifies smoking reduction and cessation for our participants, it is understandable that Tobacco 21 laws would seem illogical to some young dual users. This perspective aligns with a harm minimization approach that highlights the importance of encouraging smokers to quickly replace use of combustible tobacco products with the least harmful alternatives (Abrams et al., 2018). Tobacco 21 laws, arguably not designed from a harm minimization perspective, may create barriers for some youth to displace their smoking habit with less harmful practices. In fact, narratives from some participants under the age of 21 suggested that Tobacco 21 may have iatrogenic consequences. For example, Ian, a 19-year-old dual user explained:

It was legal for me to vape. But now it's illegal for me...to vape, which is kind of weird... It was legal for me for a year and then it's not legal like as of two months ago... <<How do you feel about that?>> Well, I feel like it's not helping (laughs). It just made all my friends who do vape go back to cigarettes...Because cigarettes are way easier to get, because a lot more people smoke cigarettes. And you can just be like 'can I have a stog?' and they'll be like 'yeah', I mean, like off the streets. ...So it's a lot easier to obtain a cigarette than it is a vape.

Echoing Ian, Jeff, the 18-year-old dual user who described the process of quitting smoking by slowly reducing the nicotine content in his ENDS, emphasized the relative convenience of accessing cigarettes over vaping devices in the new Tobacco 21 environment.

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I just think [Tobacco 21's] really annoying, honestly. It's just so much harder to get my hands on products. ...it's just a lot harder to get my hands on e-juice than it is for a cigarette honestly....Just because there's a lot more places you can get cigarettes than e-juice. And then ... I don't want to have to take my friend who is 21, to go to a vape shop, instead of just picking a close by Safeway or a gas station instead. Yeah, but I do have my friend that makes juice, so that makes it a lot more convenient.

In addition to emphasizing that the most harmful forms of tobacco (e.g. cigarettes) are now much easier to access in a Tobacco 21 environment, Jeff's narrative also raises a particularly risky way in which Tobacco 21 laws may be circumvented—experimenting with homemade nicotine solutions.

Notably, a few participants did diverge from the perspectives presented above. For example, Steven, a 24-year-old dual user who was focused on smoking cessation and who identifies more strongly as a vaper compared to other participants in the study, equivocated about how Tobacco 21 would have affected him when he became interested in quitting smoking at the age of 20.

If I was under 21, I'd be pretty upset. But I can see why they did it. Because so, if I were 19 and I was smoking cigarettes, this would almost make me choose. It's almost forcing me to quit cold turkey, and who knows where that would lead? ... because for me, when I was 20, I wanted to quit [smoking]. So, this might have helped me. But it could also be damaging in some ways...because if you vape, you know, whatever....I don't know. I have mixed emotions on it, right?

A few other participants, rather than expressing ambiguity, were indifferent to Tobacco 21 laws because they were inconsequential for them (e.g. for 17-year-old K, *There's no difference [after T21]. We still go to the same place [to buy].*), or due to strong anti-tobacco sentiment, they supported all efforts to prevent young people from nicotine addiction (e.g. for 24-year-old Candy, *I think there should be an age restriction, 21... Because younger kids are trying to do it.*).

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Overall, despite some ambivalence regarding tobacco control regulations among our participants, narratives suggest that some young dual users find themselves in a precarious position. Ironically, they share public health goals of smoking cessation while also facing some public health regulations which obstruct those goals. Recent research suggests that less restrictive vaping laws may improve smoking cessation among people who use ENDS to quit (Yong et al., 2017). Additionally, youth research suggests that in states which ban ENDS sales to minors, the prevalence of youth smoking is higher (Friedman, 2015; Pesko, Hughes, & Faisal, 2016; Pesko, Kenkel, Wang, & Hughes, 2016). Qualitative narratives from dual users in our study contextualize these findings, raising questions about whether the utilitarian meaning of dual use for some youth conflicts with tobacco control strategies shaped by the notion that all nicotine and tobacco use is excessive and should be prevented.

Conclusion

Studies of dual use among young people have raised concerns about the perpetuation of nicotine addiction and evidence suggesting that dual use may prolong rather eliminate smoking (Doran et al., 2017; Goniewicz et al., 2016; Soneji et al., 2017; Wills & Sargent, 2017). However, results of our study suggest that dual users of ENDS and cigarettes overwhelmingly perceive the utility of dual use and view vaping as a tool for reducing smoking-related harm in the near term and facilitating quitting smoking in the long term. Though this study cannot predict the future nicotine use for these participants, the fact that young dual users are concerned about the health consequences associated with their smoking and are motivated to turn towards vaping to reduce risks to their health should not be underestimated or devalued from a public health perspective. This is not to suggest that participants had entirely jumped on the bandwagon of cessation. Instead, many could be described as managing risk and reward by relying on vaping to reduce the amount they were smoking, while possessing an ultimate goal of smoking cessation.

Given the prominence of dual use as utility among our participants, we can better interpret participants' narratives of ambivalence regarding prominent tobacco control efforts. Although participants generally supported smoke-free air laws that included vaping, Tobacco 21 laws raised more concerns. Anti-

smoking sentiment was strong within our sample of youth (Antin et al., Under Review), and aside from a few narratives emphasizing one's individual liberty to smoke, restrictions on combustible tobacco products were supported by our participants. However, given that vaping signified a pathway towards smoking cessation for dual users in our study, restricting access to ENDS by raising the minimum legal purchase age to 21 was far more contentious. Given our participants' perspectives, might "there [be] somewhat of a disjuncture between the users and their own sense of [nicotine and tobacco] use and the...[policies] that are meant to encourage young people not to use" [adapted from (Hunt et al., 2007, p. 92)]?

Sociologists involved in research on youth³ and substance use (tobacco, alcohol and illicit drugs) have emphasized the tendency by public health professionals and policy makers to portray young people as either victims and thus passive, or risky or problematic consumers and by implication irrational. Young people are portrayed as having a "body in ascent" (Ettorre & Miles, 2002) or as "an unfinished body" (Lupton & Tulloch, 1998), and therefore, in viewing youth and substance use, young people are considered "unruly and uncontrolled and in need of careful monitoring [and] regulation" (Lupton & Tulloch, 1998, p. 22). This type of perspective has arguably contributed to restrictive regulations of ENDS to protect young people from becoming "victims of their own irresponsibility" (Ettorre & Miles, 2002, p. 178). However, in examining the perspectives of young dual users, our study has directed attention towards the agency of youth, the meanings that they ascribe to their own dual use practices, and the fact that their perspectives and experiences do not necessarily align with the public health policies enacted by adults (Duff, 2003; Ettorre & Miles, 2002; Hunt, Evans, & Kares, 2007).

Results of this study raise important questions about how to work towards further reductions in the prevalence of smoking and tobacco-related diseases, especially for youth who experience multiple disadvantages. Studies suggest that restrictive policies towards ENDS, which prohibit sales to minors, may have the unintended effect of increasing youth smoking (Friedman, 2015; Pesko, Hughes, et al., 2016). In

³ Informed by sociological and cultural studies of youth, we consider youth a socially-constructed category falling somewhere between childhood and adulthood and defined less by chronology and more by its progression of stages, whenever they occur (Arnett, 2005; Furlong, 2016).

particular, in California, Tobacco 21 laws do not only restrict access to ENDS to minors but also to young adults between the ages of 18-20, perhaps a crucial stage when concerns about future health and interest in quitting smoking have more salience. We cannot ignore participants' narratives that express an intentionality of reducing the harms of smoking by vaping and, for some, quitting smoking entirely. It is important to consider that some young people are struggling with quitting "cold turkey," as they say, and that they find vaping helpful for reducing the amount they smoke and may see dual use as a progression towards quitting smoking entirely. Because of strong beliefs about the utility of dual use, some participants expressed concerns about how discourses of vaping and dual use were being mobilized in the public health community to discourage rather than encourage vaping (Annechino & Antin, 2016; Kozlowski & Sweanor, 2016), causing one participant to say of our research:

I just hope that you guys got a lot of information out of me. I'm sure you did, a lot of babbling. No, I'm not even sure what ... the research is necessarily for. But I just hope that it's like very informative and tells the truth, and is not biased... Because there are people out there who just want to quit smoking cigarettes. And there are people out there who just want to live a healthier life, and that's all they're trying to do.

Narratives from our study participants underline a moral imperative to rethink assumptions about the meaning of vaping in the lives of youth who continue to smoke and whether current approaches to ENDS, and its regulation, are situated in a way that benefits the health of all young people.

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Competing interests

The authors declare that they have no competing interests.

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