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Net Effect of Young Adult Dual Combusted Cigarette and E-Cigarette Users' Anticipated Responses to Hypothetical E-Cigarette Marketing Restrictions

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Abstract

Background: Dual use of e-cigarettes and cigarettes is common among young adults. Earlier research has used an internet panel to assess anticipated effects of eliminating nicotine, flavors (except menthol), and customizable e-cigarettes on predicted changes in e-cigarette and cigarette consumption. This earlier analysis showed that all these policies were predicted to lower e-cigarette consumption and increase cigarette consumption among these dual users. The earlier analysis, did not, however, estimate the *net* effect of these policies considering both lowered and increased consumption.

Methods: We computed the net effects of these policies as the difference between people predicting quitting or using cigarettes less and those predicting that they would use them more. The same calculations were done for e-cigarettes. Significance testing was done with *z*-tests.

Results: As expected, the net effect of all three policies was to significantly lower e-cigarette consumption. The net effect was to also lower cigarette consumption for eliminating nicotine and flavors in e-cigarettes, with no significant net effect of eliminating modifiable e-cigarettes.

Conclusion: Eliminating nicotine and flavors from e-cigarettes is predicted to lower cigarette as well as e-cigarette consumption.

Keywords

Tobacco; e-cigarettes; regulation; flavors; menthol; nicotine

Some (Abrams et al., 2018), including the U.S. Food and Drug Administration (Gottlieb, 2018a), see e-cigarettes as a less dangerous alternative to cigarettes. At the same time, there has been an explosion in youth e-cigarette use (Cullen et al., 2018; Gottlieb, 2018b), driven in part by a wide range of flavors (McKelvey, Baiocchi, Ramamurthi, McLaughlin, & Halpern-Felsher, 2019; Nguyen, McKelvey, & Halpern-Felsher, 2019; Soneji, Knutzen, &

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Declaration of interest

The author reports no conflict of interest.

Data availability statement

Data were kindly provided by Lauren Pacek from the figures in her paper (Pacek et al., 2019).

Villanti, 2019). There have also been proposals to limit the nicotine content of the liquids aerosolized by e-cigarettes or limitations on open system devices (also called “mods”) that can be run at higher power to increase nicotine delivery. Limiting modifiability/customizability of e-cigarette devices may also decrease the likelihood of battery malfunction leading to overheating, fires, and explosions (Rudy & Durmowicz, 2017). While, as of December 2019, the FDA had not acted to regulate any of these characteristics, cities and states have started to limit or prohibit the sale of flavored e-cigarettes (Bach, 2019; Yang & Glantz, 2018).

In response to calls to impose limits on e-cigarettes, e-cigarette advocates have argued that such restrictions on e-cigarettes would lead adult smokers to abandon e-cigarettes and increase cigarette smoking. (Most adults who use e-cigarettes also smoke conventional cigarettes, so called “dual users” (Bhatta & Glantz, 2019).)

To assess the potential impact of these policies, Pacek, Rass, Sweitzer, Oliver, and McClernon (2019) conducted an exploratory study to assess young adult dual user responses to these regulations by conducting an online survey of 240 young adults using an internet panel (Amazon Mechanical Turk) in June 2017. Use of such panels is an accepted way to collect information to evaluate potential effects of product changes on consumer behavior (Pacek et al., 2019). They provided a detailed analysis of how these three potential regulations would affect e-cigarette and cigarette use and concluded that restrictive regulations regarding key e-cigarette characteristics may increase intentions to increase conventional cigarette consumption among young adult dual users.

While their conclusion focused on increases in conventional cigarette smoking, their paper also showed that some dual users anticipated that they would also quit or reduce their e-cigarette or cigarette consumption in the face of any or all of these regulatory changes. It is the *net effect* of these increases and decreases in product use that are of most regulatory import because if a regulatory change led more people to quit or reduce cigarette consumption than increase consumption, the net effect would be beneficial from public health.

The three specific hypothetical market restrictions Pacek et al. evaluated were: “Imagine that e-cigarettes available in the United States are like they are today BUT: (1) they are only available in nicotine-free (0 nicotine) e-liquid; (2) they are only available in tobacco/menthol flavors; and (3) they do not allow the user to modify or customize the device (e.g. wattage, air flow).”

Table 1 reproduces the data Pacek et al. reported and compares the fraction of respondents who quit or reduced product consumption with those who increased product consumption. (Those who said they would maintain consumption are not included in the analysis, since they have no effect on the net change.) p Values for the net change were computed using z-tests for differences in proportions.

Not surprisingly, this analysis of net changes shows substantial statistically significant drops in e-cigarette use are associated with all three proposed regulations. In addition, requiring that e-cigarettes not deliver nicotine without a similar requirement for cigarettes was

predicted to lead to a substantial increase in predicted cigarette use, although this increase in cigarette use would be smaller than the drop in e-cigarette use.

Both the original Pacek et al. study and this additional analysis need to be interpreted cautiously because to go from a propensity to consume a type of cigarette to the health benefits of the change would presumably depend on who was doing the increasing and who the decreasing – heavy or light CC smokers.

Nevertheless, in contrast to arguments made against FDA regulations or local laws ending the sale of flavored e-cigarettes (McGinley, 2019), banning flavors (except menthol in this study) in e-cigarettes was predicted to lead to a significant net drop in cigarette as well as e-cigarette consumption.

While prohibiting e-cigarette “mods” was predicted to be associated with lower e-cigarette consumption, it was not predicted to be associated with a significant net change in cigarette consumption.

This “net effect” assessed in this analysis is what the Family Smoking Prevention and Tobacco Control Act (TCA) requires the FDA to consider when adopting a tobacco product standard (such as a flavor restriction or nicotine reduction) under TCA section 907(a)(3). Specifically, the Secretary of Health and Human Services (acting through the FDA) “may adopt tobacco product standards … if the Secretary finds that a tobacco product standard is appropriate for the protection of the public health.” To do so, “the Secretary shall consider scientific evidence concerning— (I) the risks and benefits to the population as a whole, including users and nonusers of tobacco products, of the proposed standard; (II) the increased or decreased likelihood that existing users of tobacco products will stop using such products; and (III) the increased or decreased likelihood that those who do not use tobacco products will start using such products.”

Beginning with San Francisco, cities and states are considering prohibiting the sale of all flavored tobacco products (including menthol) (Bach, 2019; Yang & Glantz, 2018). This analysis supports the conclusion that flavor bans would not only lead to lower e-cigarette consumption but also lower cigarette consumption.

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Table 1.

Estimated net effect of restrictions on e-cigarettes on e-cigarette and cigarette consumption.

	Predicted behavior change				Predicted net behavior change			
	Quit	**Reduce**	**Maintain**	**Increase**	**Quit or reduce**	**Increase**	**Net change**	***p***
E-cigarettes								
1. Zero Nicotine	34.2%	37.9%	18.8%	9.2%	72.1%	9.2%	−62.9%	<.001
2. Ban Flavors[a]	13.8%	41.3%	39.2%	5.8%	55.1%	5.8%	−49.3%	<.001
3. Ban “Mods”	12.5%	37.5%	48.3%	1.7%	50.0%	1.7%	−48.3%	<.001
Cigarettes[b]								
1. Zero Nicotine	7.5%	19.2%	26.7%	46.7%	26.7%	46.7%	20.0%	<.001
2. Ban Flavors[a]	5.8%	25.0%	52.5%	16.7%	30.8%	16.7%	−14.1%	<.001
3. Ban “Mods”	6.3%	17.5%	54.6%	21.7%	23.8%	21.7%	−2.1%	.583

[a]Except menthol.

[b]Restrictions only apply to e-cigarettes, not cigarettes.