

Bill 233

NS Law Amendments Committee

Good Morning. I am Jody Watt and pleased to be here today. I am the General Manager of Nova Scotia's largest vaping product retailer – the 14-store Vapor Trail chain with locations throughout Nova Scotia. As well, I am the Atlantic Representative of the Canadian Vaping Association (CVA) Board of Directors, Founded in 2014; Canada's leading industry association representing over 300 manufacturers, distributors and retailers. The Canadian Vaping Association has no affiliation nor receives funding from any tobacco companies. We are the only vaping association that has scheduled quarterly meetings with Health Canada to discuss policy, and provide recommendation to government to better regulate the vape industry in Canada. Some key proposals includes:

- Implementation of a dual age verification process for online sales,
- Ban National brand specific advertising in non age restricted locations/environments.
- Limiting nicotine strength to 20mg/mL
- Strengthen border control to prevent illegal/black market and non-compliant products from entering into the mainstream market.
- Creation of a GMP Standard for E-liquid manufacturing standard program to Health Canada

1. The Vapor Trail and the Canadian Vaping Association are here to express our absolute opposition to Bill 233 and more importantly the Ministerial decisions affecting flavours and taxes that have been made. Together the flavour ban and per millilitre taxation model will wipe-out adult-only vape shops in Nova Scotia. Already, shops in Nova Scotia have begun to close. If nothing changes, we will disappear, as will the taxation income.
2. Let me start by re-stating the CVA position that vaping is for adult ex-smokers. Youth should not be vaping. Period. Adults who don't smoke should not be vaping. Period. Vaping is proven to be an effective harm reduction tool that helps smokers to stop smoking cigarettes. Already tens of thousands of Nova Scotians have quit smoking by using vape products. Essential to the migration away from smoking tobacco is the introduction of flavoured e-liquids. Logically, if the only flavour available is tobacco, ex-smokers will return to cigarettes. Flavours make up approximately 94% of our e-liquid sales. Tobacco flavours, are used to transition smokers away from smoking, not thereafter.
3. The youth vaping surge that occurred across North America in 2017-18 should be a concern to lawmakers. It certainly is for the CVA. We have been working with governments across Canada to take practical steps to stop and reverse the surge in youth vaping. All evidence shows the youth surge coincided with the introduction of stylish, closed-pod, high-nicotine vaping systems being introduced by tobacco related

companies and made available in thousands of convenience stores. The youth get a nicotine buzz and quickly become addicted. Interestingly, in the UK where nicotine levels are limited to 20/mg, and thousands of flavour profiles are available, there was no youth surge.

4. Other Provincial governments are taking effective action to stop the youth surge. They are limiting the amount of nicotine in pod systems to only 20mg and eliminating all flavours in the convenience store channels where youth have access. Instead these leaders have designated adult-only expert vape shops where the vast majority of sales must be from vaping related products, as the only venues that adult ex-smokers can continue to get flavoured e-liquids. As well, some provinces are introducing new vaping taxes to help fund enforcement and education. The CVA agrees with changes introduced by the Governments of BC, Alberta, PEI and Ontario.
5. Nova Scotia seems to have forgotten adult smokers that have transitioned to vaping as a less harmful alternative, in developing these policies. Tens of thousands of adult Nova Scotians have used flavours to help transition away from combustible tobacco. The decision made by the Nova Scotian government to eliminate flavours will destroy the adult only vape shops that are in this province. The exuberant taxation policy of a per ml tax, the highest this country has ever seen, will penalize those that are trying to quit smoking by choosing this less harmful alternative. These policies favour the tobacco industries highly addictive, low volume closed pod systems, and do not discourage youth nicotine use at all.
6. If big tobacco designed a vaping control policy framework to advantage themselves, they could not do better than what Nova Scotia has done. The policy wipes out the adult-only vape shop network, eliminates flavoured products from adult ex-smokers driving them back to smoking, taxes e-liquids by volume while ignoring nicotine potency and drives all vaping related traffic through the convenience channel where they have financial control over retailers, and no harm reduction expertise available.
7. We know that Nova Scotia wants to be a leader on the youth vaping policy agenda. We would like to work with the government to develop such a policy. The current path is a disaster for ex-smokers and small non-tobacco retailers. Please set aside Bill 233, delay the introduction of the April 1st flavour ban and sit down with our industry to develop a workable policy framework that will do what we all want which is to stop youth from accessing vaping products while ensuring that more adults can quit smoking in Nova Scotia.

From: [REDACTED]
Sent: Wednesday, March 4, 2020 5:18 PM
To: Office of the Legislative Counsel
Subject: vape pens

**** EXTERNAL EMAIL / COURRIEL EXTERNE ****

Exercice caution when opening attachments or clicking on links / Faites preuve de prudence si vous ouvrez une pièce jointe ou cliquez sur un lien

hello there i wanted to send a message to you in regards to the vaporized nicotine pens.

As ive read the news im learning that you are banning vape juices with flavours which i agree they have many flavors and in the wrong hands could be very bad for the younger groups.

But i do think that they benefit you as we read the ingredients we know the effects and we know that it also could have effects on your body that may not be very good. but its no different then cigarettes we know what they do we know they can cause health problems and or death.

So im stating all of that i would like to know what is the difference between the two ? i smoked since i was 12 and i will admit i thought it was a cool thing to do because of the older kids. so what stopped me as well as many others when i was 12 no-one wanted to ban cigarettes?

so to end this email i am stating that i stand behind the people who vape as it cant hurt you any more then cigarettes but at least i can slowly lean away from the vape then i can a cigarette.

Sent from my iPhone

My name is Eva Campbell and I own The End Vapor Shop in New Glasgow, NS. I am but one of over 60 shops in NS who will be forced to close in April if you do not reconsider your approach to regulations. Removing 90% of the product I sell will, in effect, close me down. So, since I won't be a business owner beyond this month, I will speak to you also as a vaper

After smoking for 35 years, 10 years ago I become a vaper. From the start I have vaped flavors. I have been all over every aspect of this industry. At one point (early on) I even made my own eliquid. Not my first rodeo. In most of those ten years there never was a real problem with youth vaping. Youth only started vaping in the last year or so. What changed?

Flavors? No. Like I said, I have been vaping for 10 years and have always vaped flavors. Most smokers started with a tobacco flavor but soon wanted (no) demanded more variety in flavors. The demand was in direct response to adults who (after quitting smoking) did not want to vape anything that tasted remotely like a cigarette. Thousands of flavors, long before this last year.

So, what happened in this last year or so? Big Tobacco happened. Mind you, from the beginning people opposed to vaping were under the impression that it was a tobacco product. In 2015 when the Liberals tabled a bill to ban 'flavored tobacco' they were caught with their pants down when we pointed out that there is, was and always will be ZERO tobacco in our products. We all know how that turned out, I have the word TOBACCO on the door of my shop even though I have zero tobacco inside. So, mid 2018, JUUL entered the market with a discrete device (with miniscule capacity) that delivered ridiculous amounts of nicotine. Prefilled, and disposable.

I vape 12- 18mg regular nicotine. In an open, refillable device. On average the devices hold between 2 and 4 ml. The most common bottle of juice is at least 30ml and most times 60ml. The taxation proposed will more than double what an adult pays for his eliquid. JUUL, on the other hand, came out with 59mg salt-nic in four flavors. Not thousands, four. Their pods hold less than 1ml of eliquid so the price increase for the pack of pods would be less than a buck fifty.

I know this might be all over the place but the government is trying to regulate an industry when it has no idea how it works. This is our only avenue to get this information put into the record. Before you regulate, you MUST know how it works. I can't explain it

all in 10 min. This is also why government needs to consult with the industry before they push regulations.

Justifying this type of ban by saying 'youth prefer flavors' is hardly based on science. All living beings prefer flavors. Give a dog the option of a piece of bacon or a piece of crap, he will go for the bacon...but when the bacon is gone....you get where I am going with that. They are not vaping it for the flavor. Juul pulled their flavors from the US market and their stock is still going up.

There is a very simple straight forward answer to the youth vaping problem without keeping this effective tool away from smokers who want to switch.

- Cap the nicotine content at 20mg. (I have sold nothing higher than 18mg and 7 years worth of adult customers did just fine with it.) If they don't get that head rush from 59mg, kids will put it down and move on
- Have only tobacco flavors available at the same point of sale as traditional tobacco, most smokers start with a tobacco flavor anyway
- Restrict flavors to adult only vape shops. (no one under 19 steps foot in my shop. I actually have a reputation and young people who are of legal age have their ID in hand when they enter).
- -limited capacity? Not sure how that will effect the youth uptake since what they vape now holds less than a mil of juice and is disposable. What adults use are refillable, larger capacity that also makes stepping down your nic content much easier.

These are simple things but they are things that will have a direct impact on youth vaping. Banning flavors, will have ZERO effect. Making it illegal for adults will NOT stop a kid from doing something illegal. Limiting the capacity of a device will NOT effect what the youth are vaping, it will just make it more difficult for adults.

Most of my customers are over 50 and they are damned proud of themselves that they finally quit smoking. Make it impossible for our seniors to get vaping devices and they will just go back to smoking...you can get a pack of smokes on any corner of any street. Seniors in particular need the vape shops. They are not online and they are not tech savvy....they need instruction and encouragement. I have a 78 year old customer

who quit smoking and all she vapes is a gummy bear flavor. She was in tears when I told her about this ban and that her \$20 bottle will soon cost her more than \$50.

Without flavors, I will go out of business. Period. No vape shop will survive with one flavor. No juice companies will survive making only one flavor. Banning flavors will only push people back to smoking and open up a black market and no one wins. Not the kids (who are already getting it illegally), not vape shops that will shut down. Not adults who have quit smoking with this alternative.

You know who does win? Big tobacco. JUUL (35% owned by Altira), Vype (100% owned by Imperial tobacco) and Logic (Japan Tobacco) Since they sell mainly in convenience stores (that sell hundreds of other things) they will be the only ones to survive a flavor ban. Even if vaping dies, they have tobacco cigarette sales to fall back on. They win either way this plays out.

I urge you to listen to what the Canadian Vaping Association has to say. People who have been in this industry for years and know how and why it works.

Nova Scotia can ill afford to lose yet another industry.

Thank you

NEWS

Juul bought ads on Cartoon Network, Nickelodeon to target kids, lawsuit claims

By Adam Schrader

February 15, 2020 | 8:31pm | Updated



Juul products at a smoke shop in New York City

AP

Electronic cigarette maker Juul intentionally advertised its nicotine products on kid-friendly websites, including Nickelodeon and Cartoon Network, internal documents obtained by the Massachusetts attorney general show.

Attorney General Maura Healey filed a suit Wednesday against the e-cigarette maker, which has long claimed its products are meant for adults — despite executives knowing that young people were addicted to its products.

“JUUL explicitly identified its target audience as the ‘cool crowd,’ a demographic of young people who were ‘fashionable, urban with a vibrant life,’ and ‘enjoy[ed] going out to shows and events,’” the lawsuit reads.

Juul is accused of intentionally purchasing banner and video advertisements on Nickelodeon sites nick.com and nickjr.com and Cartoon Network’s website at cartoonnetwork.com.

The company also explicitly targeted younger girls on sites including dailydressupgames.com, didigames.com, forhergames.com, games2girls.com, girlgames.com, and girlsgogames.com, according to court papers.

The suit also says Juul purchased banner advertisements on teen magazine websites including teen.com, seventeen.com, justjaredjr.com, and hireteen.com.

Juul purchased ads with a potential audience in the "tens of thousands" on websites featuring educational resources and college readiness materials, including survivingcollege.com, the lawsuit revealed.

Juul has long claimed selling to kids was "antithetical to the company's mission," co-founder James Monsees told the New York Times in 2018.

In New York City, about 13,000 middle school students huffed on an e-cigarette in 2018, according to the city Health Department — as parents nationwide started to file their own lawsuits against the company after their children died from using the nicotine products.

Juul has also been sued by New York Attorney General Letitia James for allegedly selling the products to minors over the internet, it was revealed last November.

Last year, President Trump raised the legal smoking and vaping age to 21 nationwide amid an outbreak of vaping-related deaths. As of Feb. 4, e-cigs have caused 64 deaths, according to the Centers for Disease Control and Prevention.

Last month, the FDA announced it would begin banning flavored Juul pods — favorites for young vapers — just after Mayor Bill de Blasio signed a law prohibiting the sale of certain flavors in the city.

FILED UNDER ADVERTISING, CARTOON NETWORK, DONALD TRUMP, JUUL, LAWSUITS, MARKETING, MASSACHUSETTS, NICKELODEON

Thank you for allowing me this opportunity to speak and I hope you will allow me to address all of the recent legislation re: vaping regulations – I will keep it short and hopefully, to the point

Let me begin by saying I am absolutely opposed to youth being able to purchase vaping product and I agree that suitable measures must be taken to ensure that vaping products are reasonably restricted

At our specialty vape shop, the first brick and mortar store in HRM - established in 2013 by my now deceased partner, Kyle Kurts – we have not only always complied with regulations, we started them by restricting store access to those

19 and over – and stand by the increase to age 21 if the province so chooses
We have come under fire by customers who get upset when we will not allow them to bring their children into the store even when accompanied.

That said, we have always considered ourselves an ADULT-ONLY shop and we believe that adults should be able to freely access products of their choosing

Vaping has been proven to assist adult smokers in moving into a less harmful manner of dealing with addiction – flavours are one of the enticements for steering away from tobacco while still providing the psychological crutch of hand to mouth smoking that is as much a

part of nicotine addiction as the nicotine itself.

Eliminating flavours will effectively close down our stores, but worse, will open up UNSAFE product in the black market. For those who think the black market and unsafe product doesn't exist, allow me to tell you that the founder of my company, Smoke-less, died as a result of an accidental overdose from depression. The overdose consisted of fentanyl and heroin – both of those being obtained from the internet black market and readily available – delivered to his door, in fact.

The black market exists and it will spawn unsafe product. We have recently been legitimized by Health Canada

insofar as regulations have been implemented and we stand by them.

Big tobacco, a co-owner of the Juul pod system – which we now refuse to carry – was partially responsible for making vaping so attractive to minors by advertising on TV networks such as Nickelodeon and The Cartoon Network – both of which obviously cater to youth.

We have agreed to remove “dessert flavour” names of juices. We agree to package design, health warnings and ingredients.

We do not agree with the removal of flavours – presently sitting at more than 70% of our sales to ADULT users – and we do not agree with unfair taxation.

I am here today to ask you to reconsider the >50 cents per ml tax to a percentage tax based on the retail selling price.

While we don't agree that a harm-reduction item should be taxed, we do agree that a percentage tax is more fair and the best way for the province to collect fair tax dollars to pursue further youth education into the risks associated with youth vaping. If the tax goes through as it is now tabled, it will make the cost of eliquids prohibitive to lower-income individuals. As addictions are an outlet for stress, and can we imagine a bigger stress than not having enough money to make ends meet? – we need to make this less harmful experience available to current smokers. Especially those who can barely afford it.

From my personal experience, I can tell you that I was a life-long smoker and now that I vape – a flavour and for the last 5 years – I feel better and truly believe it is the lesser of all the addiction evils.

Before I finish, can I also add that youth access is the biggest issue and I believe that all tobacco and vaping product should be removed from gas stations and convenience stores and only available in specialty shops where we ensure we are compliant.

Youth will always be rebellious so access should be the starting point, not the flavours.

The UK doesn't have the issue we have with youth uptake – we should be looking at them as a model.

As part of voluntary compliance issues, and as a head start on expected compliance, allow me to assure you that Smoke-less has done the following as it relates to youth vaping –

We took down all of our social media sites because youth could see us

We do not advertise – period – in any form – social media, print, radio, or TV

We made our website static with no online ordering available

We removed our discount program to comply with no Point Of Sale ads or promotions

We ID everyone who appears to be under the age of 30

We do not allow minors, even if accompanied, into our stores at any time

We have removed all product from the shelves that do not meet Health Canada standards

And we agree with nicotine cap limits on product

In short, we agree to every measure being taken with the exception of the

flavour ban and the unfair taxation of
product.

Thank you

I am writing to voice my concerns regarding the amendment of the sale of Vape e-liquid.

I was a smoker for over 25 years, and if it wasn't for vaping, I would never have been able to quit.

I do not agree with the ban on flavoured juices, nor do I agree with the limitation on the nicotine amount. I am fearful that ex cigarette smokers who now vape, will start smoking cigarettes again.

Thank you for your time and consideration.

Kindest regards,

Melinda Crowe

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

My name is Sarah Blades and I am a Prevention and Health Promotion specialist with the Mental Health & Addictions Program at the IWK Health Centre in Halifax. The focus of the work I do is to address the social determinants of health that significantly influence mental health outcomes and substance use risk among Nova Scotian youth. This work includes influencing the policy environment in which Halifax's children and youth live, learn and play.

It is a pleasure and a privilege to appear today and speak in support of Bill 233 and the proposed legislative amendments to the Smoke-Free Places Act and the Tobacco Access Acts of Nova Scotia.

The proposed amendments will strengthen supportive smoke free environments, pave the way for provincial regulation over highly addictive nicotine concentration limits in vaping products, and will begin to match enforcement over electronic cigarettes with other types of tobacco.

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

This government should be applauded for the comprehensive approach it is taking on regulation, thereby reducing the harms of nicotine addiction for youth especially with respect to increased taxation, removing retail access to flavoured vaping products, restricting nicotine concentration limits and improving smoke free environments. These important amendments will certainly contribute to healthier futures for our children and youth.

ENVIRONMENT

When legislation reduces the amount of smoking in public places, the behavior becomes denormalized. For this reason among others, it is important that the entirety of restaurants and patios remain smoke free places. The amendment in the Smoke Free Places Act clarifying the definition of a patio and closing related loopholes will sustain the protection for establishments as smoke free places not just for children and youth, but for everyone.

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

Other environmental considerations include the social policy and marketing environments. In a recent study by Dr. David Hammond and colleagues, international comparisons of youth vaping behaviour between 2017 and 2018 show that while US and Canadian youth have increased regular vaping between the two time points, youth in England have not increased their vaping over time, and remain at lower rates than in the US and Canada. Data from 2019 soon to be released by Dr. Hammond and colleagues indicate that this effect continues to strengthen. In England, marketing is restricted and nicotine concentrations are capped much lower than what is permitted in North America. These findings reinforce the impact that strong regulatory environments can have in reducing the spread of a youth vaping epidemic.

Further success in reducing vaping harms can be achieved when we also consider the online environment. Increased marketing via promotion by influencers on social media platforms that youth

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

frequently access is of concern. In late December 2019, Facebook and Instagram took a strong stance in banning influencers from advertising vape products on their platforms. The relatively unregulated online sale of vape products can be another access point for children and youth. It would be prudent for the province to consider the implementation of an online retail ban, to ensure vape products are only being purchased by people over the legal age limit.

EMERGING PRODUCTS

The proposed amendments additionally provide a solid base for our government to regulate emerging nicotine delivery products. This is essential as the tobacco industry will very likely evolve product development to respond to consumer preferences and changing regulatory landscapes across the globe. This amendment language enables the province to be nimble in responding to new nicotine delivery products that may be enticing to children and youth.

NICOTINE CONCENTRATION LIMITS

Medical experts concur that nicotine exposure has a severe negative impact on the developing brain. Early, regular exposure to nicotine predisposes youth for other addiction problems and concentration problems among other challenges in life.

Working in the area of the social determinants of health, we know that educational achievement correlates with higher socioeconomic status.

When a young person experiences challenges in school because of addiction, impaired concentration, and other barriers, they are disproportionately impacted by poorer or insecure work opportunities, insecure housing and poverty. In turn, disadvantages in these areas are correlated with poorer health overall. Nicotine addiction is not a habit, but a treatable illness. Regulatory structures like these additionally reduce the burden on our social and dependence treatment systems.

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

Attractive candy and sweet flavours are a key factor in youth initiation of vaping. In addition, potent nicotine salt formulas of vaping liquid deliver a large amount of nicotine without the harshness of regular cigarettes, facilitating addiction to develop. The cost for 4 highly concentrated nicotine liquid pods is significantly less than what the equivalent in 4 packages of combustible cigarettes would cost, making them further attractive to youth. These products are readily available at gas stations, convenience stores and grocery store tobacconists. Based on the current state regulatory environment, it does not seem difficult to understand why so many Nova Scotian youth, their schools, and their caregivers are concerned about increasing vaping rates.

ENFORCEMENT

The amendments to the Tobacco Access Act empowering officers and inspectors to confiscate electronic cigarettes more accurately reflect the validity of the harms presented by these items.

We support the non-punitive approach of confiscation and not charging children and youth. It is also our position to increase enforcement activities in the direction of retailers and specialty vape shops, so that the burden is placed with adults who are responsible for the sale of products under the act rather than youth.

Finally, we also support strengthening the proposed amendments with the concurrent bills introducing higher taxation of vaping products and licensure for their retail sale, and the previously introduced vaping product flavour ban. According to recent local data, many youth who vape indicate that they would quit if flavoured vape products were no longer available. There is an international consensus that youth are

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

very sensitive to the price of products. After implementation of increased cigarette taxation in Nova Scotia, rates of youth smoking plummeted. We look forward to similar success with the proposed amendments and the comprehensive approach tabled in the Legislature.

CLOSING

In summary, the IWK Mental Health & Addictions program supports the proposed amendments in Bill 233. In making these changes, Nova Scotia would join a long list of jurisdictions that are taking direct, impactful regulatory action to protect the health of youth. Just recently, PEI has implemented a restriction of the sale of tobacco products to people over age 21. The same has been applied within many of the United States. Strong legislative changes are being made on the West Coast of Canada in British Columbia including lower

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

nicotine concentration limits and unique taxation structures. These are examples by which Nova Scotia, and the rest of the country, can be inspired to act.

It is incumbent upon the IWK to improve and protect conditions for our children and youth to thrive. One of the ways we can do this is by enabling Nova Scotia's youth to grow up free from the impacts of nicotine addiction and to live long and healthy lives.

Members of the Law Amendments Committee, thank you for your time and I am happy to address your questions.

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

Q&A

Q1. Why would you restrict adults from access to ++ nicotine concentration liquid for titration/cessation?

- Restriction on nicotine content is important especially in pod/nicotine salt devices as they are most easily obtained by youth from corner stores and the peer to peer market.
- Devices that can modify nicotine content from vape liquid are readily available to adults in 19+ vape shops.
- Adults who smoke are unlikely to progress to cessation of nicotine addiction, when they switch to vape products, and only are switching the nicotine delivery system from commercial tobacco cigarettes to vaping devices.
- The small inconvenience of reduced access for adult smokers does not outweigh the obligation for our government to protect children and youth from these products.

Q2. Why would you restrict vaping on patios when the risk of second hand smoke is low?

- The move to close loopholes in the Smoke Free Places Act serves to protect the environment from any exposure to second hand smoke. When we restrict the places where smoking is permitted, we continue to build a supportive environment that does not normalize smoking.
- This is especially important when we consider the impact of environmental cues for people who are attempting cessation and for children & youth.

Q3. Vaping flavoured e-juice is the best way for me to quit smoking, why is it further restricted and making it harder for me to quit cigarettes?

- Vaping is not considered to be an evidence based quit method, and is not like regulated Nicotine Replacement Therapies regulated by Health Canada.
- The risk to youth of continuing to offer flavoured vape products for retail in Nova Scotia far outweighs the benefit of providing the product for a small portion of adult smokers who choose to vape over smoking cigarettes. The IWK supports a healthy future for women, children, youth and families – including an environment that reduces harms from nicotine addiction.
- Although flavoured vape juice is popular among adults who vape, it is one of the leading factors in a young persons introduction to vaping. OR>>> Most young people who vape have never smoked, and a common enticing factor is flavoured vapes.
- <https://truthinitiative.org/research-resources/emerging-tobacco-products/few-adults-start-using-juul-quit-smoking-new-study> Vaping does not usually turn into quitting for adult smokers.
- Smokers' support for tobacco endgame measures in Canada: findings from the 2016 International Tobacco Control Smoking and Vaping Survey
<http://cmajopen.ca/content/6/3/E412.full>

Sarah Blades – IWK Health Centre Mental Health & Addictions Program

Results: Among cigarette endgame policies, support was highest for reducing nicotine content (70.2%), raising the legal age for purchase (69.8%), increasing access to alternative nicotine products (65.8%) and banning marketing (58.5%). Among e-cigarette policies, there was majority support for restricting youth access (86.1%), restricting nicotine content (64.9%), prohibiting use in smoke-free places (63.4%) and banning marketing (54.8%).

Q4. There's a lot of talk about enforcement, what novel practices would be successful in reducing access and marketing?

- The IWK Health Centre advocates for a stronger retail structure for tobacco and vape products, in that raising the age to purchase to 21 would largely remove a peer to peer source for youth. International evidence agrees that raising the legal purchasing age of tobacco to 21 means that a 21 year old is much less likely to be in a peer group with 17 and 18 year olds, than a 19 year old. This removes the legal purchaser from a peer group and results in less access to tobacco or vape products for youth.
- We support the recent announcements in the provincial budget for 20/21 include measures to increase taxes on vaping products. We know from international evidence that youth are price sensitive when likelihood to purchase is concerned. Increasing the price of tobacco products has historically produced dramatic reductions in youth smoking rates in NS.
- We would also applaud a move to only allow advertising of vape products in specialty vape shops where only 19+ persons can enter. This further denormalizes the sale of vapes in corner stores and other locations.

Q5. There are a lot of unknowns about vaping, isn't it premature to restrict these items in such a harsh way?

- Vaping may be less harmful than smoking combustible tobacco, however it is not risk free.
- The more research evolves on vaping, the more we know about EVALI, vape smoke particulate contents and the impact on human health.
- The purview of public health approaches are to adopt measures according to the precautionary principle and until shown safe and effective, to restrict.
- These proposed amendments also mobilize the NS Government in reducing risks that may quickly arise from the ever changing landscape of nicotine delivery methods developed by the tobacco industry (hookah, snus, tobacco free chew, gels, etc). The industry will continually adapt to a regulatory framework and this frees NS to address concerns as they arise.
- NS is just one additional jurisdiction in a long list of jurisdiction that is seeking to highly regulate these products.
- As researcher Dr. David Hammond indicates, cigarettes have been commercially available in Canada for decades. Only recently have they been regulated, taxed and plain packaged to reflect the need to restrict access to these products.

Good Morning Mr Chair,

Members of the Law Amendments Committee

My name is Caitlynne Hines, I am the operations manager for Halifax Cloud Company, a ~~very~~ small business co-owned by my partner, Nick Flynn. However, today I'm not here for myself, my partner, or even the business. I'm here for ~~you~~ ^{for those} ~~you~~ ^{I'm here} reason, logic, and science. I'm here for those who can't be.

Before I started working with my partner, I was ~~an~~ ^{long standing} Executive Director and Science Communication Officer for a science education and advocacy organization. My degree is in science communication. I am an expert in debunking junk science, identifying bias, and explaining difficult concepts to public audiences.

^{never expected}
I just ~~didn't expect~~ harm reduction to be one of those difficult concepts. I ~~won't~~ ^{pounded} ~~assault~~ you with facts (there's only two I'll mention) because the Canadian Vaping Association has them in spades and has been pounding on your doors for months desperate to be allowed the privilege of presenting them to you.

No one in this room wants youth vaping – except maybe if there's a Juul rep here

(I know they, a big tobacco subsidiary, were the only industry consultation taken

by this government). ^{and (coincidentally)} ~~and~~ the only company ^{in Canada} not hurt by this ~~tax~~ ^{proposed legislative} ~~taxation~~ ^{change}.

People who walk into our shop get IDed as soon as they come through the door –

the NSLC doesn't check until you're ready at the counter – plenty of time for

youth to browse the vast variety of flavoured alcohols available. Do you think

banning Raspberry vodka will reduce yearly stomach pumps in hospitals?

But I digress – alcohol is a separate issue.

No one in this room believes that vaping is 100% safe. Putting anything in your

lungs besides fresh air isn't going to be good for you.

However; for many Nova Scotia residents this simply isn't an option. Nicotine is

notoriously one of the hardest substances to break an addiction to and unless

you've experienced it you can never really understand.

That's because smoking is more than an addiction – it's a series of habits.

The psychological habits of a smoke after waking up, after a meal, before bed.

There's the hand to mouth reward conditioning— not to mention the social aspect.

Forget about the nicotine addiction – imagine trying to break multiple ^{habits you've} years long ^{had for years all at once} engrained habits all at once. It's these habits that often cause people's will power to falter ^{more} so than the nicotine craving. Vaping helps mitigate those factors and is incentivized by flavours.

If you have a sweet tooth, is replacing cookies with a rice cake really going to do the trick? For an addict, the choice between a ^{what will become} \$60+ bottle of flavourless e-liquid, nothing, or a \$20 pack of cigarettes is an easy one and I think you know which option it is.

While vaping may not be harm/less is is less harmful, and I'd like to come back to the two facts I alluded to earlier:

1. 100% the 'vaping related' illnesses from last fall were caused by illicit THC cartridges containing Vitamin E Acetate as recently confirmed by the CDC

I understand that due to unjust media hysteria, this government was under pressure to take action and a flavour ban was the quickest and easiest route

news cycle has moved on so its time to look for
The notes of angry Facebook moms have moved on so to look for
rate. A similar quick fix
available. But that doesn't mean it was most effective option - raising the age to
for example a better starting point would have been
21 makes far more sense from a youth brain development and social access
which
standpoint for vaping, alcohol and cannabis – which also comes in a flavoured
vaping form and seems to be missing from this legislation.

But I digress – cannabis is a separate issue.

re second fact
✓ Vaping is 95% less harmful than smoking.

This statistic is thrown around a lot but where does it come from and what does it mean? A lot of advocates actually get this one wrong – The 95% comes from comprehensive, independent reviews of the scientific evidence by both Public Health England (Health Canada) and the Tobacco Advisory Committee of the UK Royal College of Physicians, one of the most respected groups of health care professionals in the world.

In science, a literature review takes data from, in this case over 200 studies in a similar subject area and uses them to identify patterns and make generalized

conclusions and recommendations about said subject. ~~They do this every few years and just released another update yesterday.~~

*subsequent updates
PHC updates
1 yesterday*

I'd be happy to walk anyone through the initial 113 page report but for now, I

heard a great analogy during the second reading of this bill that I'd like to
paraphrase and reuse: If I have to be hit in the face, I'd rather be slapped than
punched. Both are going to hurt, but one hurts much less.

Nicotine in and of itself, while highly addictive, is relatively harmless to adults.
It's a low-level stimulant on par with caffeine. What causes illnesses in smokers is
the combustion. The additives and preservatives. The vast majority of the
chemicals causing smoking-related disease are completely absent in vaping. Those
that are present are in such low ~~concentrations~~ ^{quantities} they pose limited danger as

toxicity is determined by both concentration and length of exposure. *It's the
difference between standing in Chernobyl vs standing 500m away from
a nuclear power plant. You'll still get some radiation, but it is much, much safer for
you to be there for long periods of time.*

Additionally, studies which have found higher levels of chemicals have been
retracted. This is because during those studies, the devices were improperly used
causing the cotton wicking in the device to burn and give off smoke. Burning

cotton, not vaping.

In the time I've been speaking
The science is in, and vaping works. ~~Every five seconds, someone in Canada~~
a Canadian has died from preventable tobacco related illness
~~dies from a smoking related illness.~~ Your so-called prevention will send people to
the grave – or at the very least put even more strain on our already crumbling and
frankly abysmal health care system.

leave my career
I made the decision to work at Halifax Cloud Company because it allowed me
the PRIVLEDGE of helping people in their journey to quit. And people have quit.

I choose to work in a vape shop because I believe in these products and their
effectiveness - because I get to experience, on a day to day basis, the pride people
feel when they say they haven't picked up a cigarette since the first day they
came into the shop, to have a visible, measurable, positive impact in the
communities we're located in.

to keep my
So no, I'm not here fighting to keep a business operating or ~~because I want~~
job - I want to
~~menthol e-liquid.~~

I'm here today pleading for education.

I'm here today hoping for open minds.

I'm here today begging you to do nothing more than actually *listen*.

I'm here for the elderly with 50+ year addictions who no longer need help

breathing – for the people who are low-income (the largest percentage of

smokers) who often make the choice between cigarettes and food – for the

I'm here for the children of smokers.
people who are thrilled to call themselves ex-smokers.

*Something I experienced from
my parents as
a child*

I'm here for the people who have tried and tried and tried everything else and

finally, *finally* found success only for you to take it away from them.

The only thing vaping and cigarettes have in common is nicotine. Following the

logic in Bill 233 apples and eggplant be classified as a tobacco product.

Furthermore, ~~the vast majority~~ ^{most} of nicotine is ^{in vaping products} synthetic or extracted from non-

~~tobacco sources.~~ *The nicotine in Vaping is the same
pharmaceutical grade as found on other NRTs
which are not class. fied as tobacco.*

This time I don't digress - tobacco is a separate issue and that's the point.

Right now, Nova Scotia has an amazing opportunity to have the most protective and progressive vaping laws in the ^{country} world. To be a world leader in harm reduction.

Please do everything you can to protect our youth – but protect our adults too.

Please exempt ADULT ONLY retail locations from Bill 233, Smoke Free Places Act and the Tobacco Access Act. Unless you do, adult only access channels will cease to exist and you lose not only the care and education they provide but you lose all those ~~precious~~ tax dollars you're counting on too.

Work with industry and the CVA to help create a bill and regulations separate

from tobacco that encompass the full scope of the vaping industry.

Because we do want regulations. We want permits and licencing ~~with~~ mandatory

ID scanners on the doors. We want a nicotine cap. We want reasonable and logical taxation.

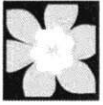
We want youth to stop – or even better, never start - vaping. We want big tobacco to ^{bleed} suffer for what they've done.

In conclusion, if you care about the health and well-being of ALL Nova Scotia residents – stop handing them a pack of smokes.

Thank you.

is every other country
Province has

because if anything has
been made clear by this bill
is that this government doesn't
know enough about these products
to make a good decision
if this bill has
been made clear
because it's been clear
made clear through this bill
that this government
doesn't know enough
about these products
to make a good decision



Proposed amendment to Bill 233 to ban Internet sales of tobacco and electronic cigarettes

Here is the text of a proposed amendment to Bill 233 that would have the effect of prohibiting Internet sales of tobacco and electronic cigarettes.

That Bill 233 be amended by inserting the following after clause 4

4.1 Section 7 of Chapter 14, as amended by Chapter 21 of the Acts of 1999 and Chapter 26 of the Acts of 2015, is further amended by adding immediately after Section 5 the following Section:

5.1 (1) No person shall sell tobacco or a tobacco product except in a tobacco retail outlet, with both the operator of the retail outlet or an employee of the operator and the purchaser physically present.

(2) For the purposes of subsection (1), a tobacco retail outlet is a fixed place permanently delimited by continuous floor-to-ceiling partitions or walls that is accessible only through an opening equipped with a door and in which tobacco or a tobacco product is sold.

Note: The existing definition of “tobacco” in the Nova Scotia *Tobacco Access Act* includes electronic cigarettes.

The proposed amendment above is based on wording in the Quebec *Tobacco Control Act* adopted in 2005 and continuous in place since then, and which is as follows:

<https://www.canlii.org/en/qc/laws/stat/cqlr-c-l-6.2/latest/cqlr-c-l-6.2.html>

14.1. Tobacco may not be sold retail except in a tobacco retail outlet, with both the operator of the retail outlet or an employee of the operator and the purchaser physically present. For the purposes of this Act,

(1) a tobacco retail outlet is a fixed place permanently delimited by continuous floor-to-ceiling partitions or walls that is accessible only through an opening equipped with a door and in which tobacco is sold retail by the operator of the place;

(2) a person other than a tobacco farmer or a tobacco product manufacturer or distributor who is in possession of or holds a quantity of tobacco that exceeds the amount the person needs for personal consumption is presumed, in the absence of any evidence to the contrary, to engage in the retail sale of tobacco.

Shauna Walker Young

Customer Service

A large part of our success can be attributed to our customer service and how much education we provide to our customers. This is not just a sales-clerk position. There is much more to our customer service than selling what is asked for. You will be expected to educate customers as well. Often, they will ask for recommendations. It is so important to get to know all about the products.

Our job is to make customers feel comfortable in our stores and want to stay longer. As soon as anyone walks into the store they should be enthusiastically greeted with **eye contact**..."Hi, I will be with you in a second." If you are in the middle of setting up a customer and you are going to be a while, please take a second and check with the new customer if they just wanted a coil or a bottle of juice. Most times the current customer doesn't mind because they don't want to feel rushed or have someone standing over them impatiently. If the new customer is going to be longer than a minute, you will have to let them know you will be with them as soon as you complete your current sale.

When setting a customer up, it is necessary to turn on any electronics to ensure they are properly working. This includes the charging cable and port. Everything is to be checked to ensure the box and its contents are complete. Our goal is to have the customer using their new vape when they step outside

All mod sales must be opened before customers leave the store. It is important to check all is ok with the mod and the boxing is complete. Unfortunately, we do get duds once and a while and nothing worse than coming home with something new that you can't use.

Sometimes things are missing from the box, even when you just opened it in front of the customer!

If someone buys a coil, ask them if they want it put in now.

If someone buys a bottle of juice, ask them if they want you to fill their tank.

Greet everyone like they are your long lost cousin that you have been waiting to see again!

Please note this advice and put into practice in your stores. It will save a lot of heartache in the future for everyone.

Understand, these customers are fighting a strong addiction. They are going to be frustrated, angry and confused. You need to guide them because they are in unfamiliar territory.

When setting up a customer it is important to explain many things. Not only about how to use the product they purchased, but also what to expect.

You can be sure one of the issues customers have when starting is withdrawal. They think because they are getting nicotine, they should not feel the anxiety and frustration of quitting smoking. They need to understand they will still suffer withdrawal! Their body is still missing the other 4999 chemicals that come with combusting a cigarette. Their body is used to those as well, so, even though they get nicotine, they need to understand they will still feel those feelings.

Let them know every cigarette NOT combusted is a win.

Let them know they shouldn't feel defeated if they have a cigarette! I tell them my mother started

vaping but it took her a while to get rid of that morning cigarette. But eventually she DID. Remember every cigarette not combusted is a WIN. Some people would come in and tell me they were going to finish their last pack and then start vaping. I ask if they mind a little advice from me. Most say sure. I tell them I have seen success with people starting vape and having some cigarettes available so if they have a weak moment, they are not running to buy a whole new pack just to satisfy this moment. It is calming to know you have back up. Even if you don't use it. Many come back and tell me they didn't even need them.

Also, be clear that they may need some tweaking with their equipment. Maybe they would need a different level of nicotine, or need a different ohm coil. Different air flow or temperature. Let them know there are many things you can change that could help. Tell them not to feel defeated if they feel it is not working. Tell them if they feel that way to come back and we can look at those other possible changes to make it more personal to them. Please be sure to stress what to expect with the coils. Of course, initially they will be trying their new vape with you, there, because you have set them up and shown them how to use it. If you can, step outside when they are trying it for the first time. It is a good time to check temperatures for them and air flow settings. They need to know after a few days they may need to change the coil. I tell people I don't like to give specific timelines for the life of a coil. It is so VARIABLE. I say expect anywhere from 1 week to 1 month! There is no set time and you don't want them wasting coils if they don't need to. They will appreciate hearing you say that. I tell customers either they won't be able to get a puff or it tastes like they are licking an ashtray. They will notice their juice doesn't taste the same. That is the time to change the coil...or pod, as is the case more recently. When you send them on their way with all this knowledge, the chances of them coming back very frustrated are less. The more education they get the happier they will be at the time of purchase and after because they won't be surprised. When I set up someone, it usually takes about 30 minutes. If another customer comes in that just wants juice or a coil, they usually understand if I jump over to help the new person, because they know they will be there for a bit getting this education. This is important information that we are sharing. It is for the success of the customer. They are successful in quitting and we gain a loyal customer.

Of course, you have to judge the customer for how much knowledge they can retain. You don't want to scare them. Honestly, the older the customer, the more basic information I give them. I make them practice turning it on and off when I am standing there. Have them take off the tank to show how to change the coil. I need to know they probably won't go home and panic because they don't know how to use it.

Tell customers not to worry, the store is open 9 to 8 and they can come in any time for assistance. I would tell the customer even to come back if they are not comfortable changing the coil. I would do it for them. They appreciate the extra service/ support.

This is very different from the convenience store business. We are more like counselors than sales clerks. This is the level of service we should give.

Examples of our Great Customer Service

"Hi. I Have been coming to your shop on Sackville Dr for a while now. Well my husband has for me 😊:) I came in on Tuesday afternoon as I needed to choose a new Juice brand as the one I had been using is discontinued. I also was having issues with my tank and not being able to get a proper draw off of it.

I asked if maybe it had worn out and was having leaks ect and did I need to replace it. The young man working said it probably needed to be cleaned. He took the time to clean my tank and once that was done he spent another 15 or 20 minutes helping me choose a new juice. I left with a new brand of Juice and a pack of coils 😊:) However what I really left with was the best customer service experience I have ever had. He was friendly helpful and attentive. He could of tried to sell me a new tank and I would of bought one but he did not. What he did do was ensure a repeat customer and I will be sure to recommend you guys to anyone and everyone."

So I went to The Vapour Trail today and received the best Customer Service of life! I have official quit smoking over a month now and no looking back. Today manager Bob helped me take it to the next level and hooked me up with a great Vape. Not only did he let me try all the samples of my juice but he showed me how to change my coils, keep my device clean and lots of great tips all around! He was funny and patient with all my One Million (Austin Powers finger) questions! If you wanna quit smoking this is the place to go! Great Price, Great Service and most important Great Product. Thanks Bob

Exceptional customer service!!

Lacey had a competitors customer call with some questions about the Aspire Plato. This is a product we don't carry as you all know. Lacey went on the computer, researched the product and printed off all the info on the product. She watched reviews and was completely prepared when the customer came in for answers. Please know, Lacey was a non vaper when she joined us less than three months ago. We now have a customer for life, and he has promised to tell everyone he knows that vapes to come to The Vapour Trail, Quispamsis.

Words can NEVER be enough or how many times I say thank you to what you have done for me today and it's the smile I so needed today...I stocked up on your recommendations of my Vapour juices that I so love and I thank Matt for that and the other Matt at the Spryfield Location and thank you for Always saving them for me until I get there...I miss going out to see everyone at the Joseph Howe but I will have a safe car soon and I look forward to the trip because it's Always worth it when I go there...I get the inspiration I need to keep fighting and keep smiling....I will see you again soon and I got wonderful service as always and the savings I got today??. Brought tears to my eyes... So, thank you to everyone at the Vapour Trail locations. See you again soon. ❤️🙏

What vape shops get these kinds of compliments? We go the extra mile!

Law amendments submission, Bill 233

Good day Mr. Chair and members of the Law Amendments Committee.

My name is Dr. Gary Ernest. I'm a family physician of more than 30 years and I'm here today as President of Doctors Nova Scotia.

Doctors Nova Scotia is strongly in support of Bill 233 introduced by Minister Delorey, which proposes amendments to the Smoke-free Places Act and the Tobacco Access Act.

We applaud the government's efforts to protect Nova Scotians, particularly youth, by further strengthening legislation following the ban of flavoured e-cigarettes and juices in December of 2019.

As a physician, whether I've been working in my office practice, in the emergency department or in the community, I've seen first-hand the negative effects that tobacco and related products have had on the health of our citizens. I fear for the future of our youth, as far too many are embracing vaping.

The tobacco industry continues to produce products that will addict people and expose them to harmful chemicals, including tobacco-less products. It's important that our province enact the appropriate safeguards to protect youth from the harmful effects of tobacco and nicotine-related products.

Capping the level of nicotine in products is vital to protecting young Nova Scotians from unwittingly ingesting extremely high levels of nicotine via vaping products and becoming addicted to nicotine as a result.

Government must be nimble and be given the authority to control tobacco-less products, which contain nicotine. Tobacco companies will look for various ways to sell and market their products, and government must be able to meet them head-on.

A strong message that emphasizes the dangers of vaping would be supported by giving peace officers the authority to confiscate and dispose of e-cigarettes when found on underage youth. This will help officers enforce the law with regards to a ban on minors possessing vaping products. And further, peace officers must be given jurisdiction so that vendors and their employees are required to provide information and reasonable assistance in investigating a potential breach of the act.

Outdoor spaces where people work and frequent must remain smoke-free. To help with this, we support clarifying language so that businesses cannot unfairly 'de-license' parts of their patios to create a smoking area.

Our province has made extensive headway in the fight against smoking and tobacco use. The arrival of e-cigarettes and vaping has created an opportunity for tobacco companies to market their products to more people, particularly youth, and we're losing hard-won ground. And who suffers? Our patients, young and old, as they are afflicted with the effects of lung disease...a preventable set of illnesses that burden our health-care system.

Today, I implore you to make the right decision and support Bill 233.

Thank you for the opportunity to appear before the committee. I am now happy to take your questions.

Sincerely,

Gary Ernest, MD, CCFP, FCFP, MBA
President



March 5, 2020

Notes on Bill 233

Respected Chair and members of the Law Amendments Committee,

I am thankful for the opportunity to speak about Bill 233. Smoke-Free Nova Scotia is a coalition of members with the shared vision of a smoke-free province. Throughout the years, the Government of Nova Scotia has demonstrated bravery in doing what is right for Nova Scotians and their health, especially our loved and valued youth who are the future of this province. Bill 233 is consistent with the Nova Scotian saga of public health and policy leadership.

We commend the government for proposing this bill in addition to the taxation changes that were formerly announced with the budget for 2020-2021.

I will comment on the importance of the policy levers within Bill 233 to substantiate moving forward with them. But before I do that, it is imperative to understand why the bill is warranted at a high level:

- In principle, the only reason to have vaping products in the market must be as an alternative to smoking for adult smokers who have failed to quit using evidence-based smoking cessation methods such as counselling, prescription drugs, and pharmaceutical grade nicotine products, and only after understanding that vaping products are associated with direct harms (e.g. lung illness).
- To protect underage youth and non-smoking adults from initiating vaping, the product must be available under very strict legislative parameters.
- There is a real risk that youth will transition from vaping to smoking. This gateway hypothesis has been substantiated by published studies. That risk should always be considered of utmost importance when weighed against the inconclusive evidence on the potential for e-cigarettes to be used as smoking cessation aids.

As for the policy levers from Bill 233 and taxation piece from the budget announcement, I have 4 points I want to make.

1. *Capping nicotine concentration levels at 20 mg/mL, which is the European Union's limit, is fundamental for reducing the potential for youth to become addicted to nicotine.*

A Smoke-Free Nova Scotia survey of 670 youth and young adult e-cigarette users revealed that among youth who vape nicotine-based juice, the majority (66.5%) use concentrations of nicotine 50 mg/mL or higher. Take a few seconds to think about this. Most of our youth e-cigarette users in the province use products that contain two-and-a-half times more nicotine

than the legal limit of the European Union. This is unacceptable and Bill 233 and will change that.

2. *Taxation is needed as a policy lever to reduce the affordability of vaping products for youth and to reduce the potential for vaping-related harms.*

Smoke-Free Nova Scotia's survey found that 63% of youth who vape (ages 16-18) purchase their vaping products using money earned from their jobs. In other words, youth can easily afford these products and that is why we need higher taxes. The tax increase announced with the 2020-2021 budget will reduce the affordability of vaping for underage youth.

3. *Tightening existing loopholes in smoke-free places by including patios as a smoke-free area is important to de-normalize smoking and vaping behaviour.*

There is overwhelming evidence that supports the importance and effectiveness of smoke-free policies and I find no need to delve into the details here.

4. *Adding to the enforcement powers of peace officers with respect to vendors and employees of retailers that sell vaping products is important to reduce illegal sales of vaping products.*

Smoke-Free Nova Scotia's survey with youth and young adult e-cigarette users found that 33% of youth who vape (ages 16-18) report retail locations in Nova Scotia as the most frequent outlet for accessing their vaping products. Bill 233 will allow officers to tighten enforcement and alleviate these concerns.

In closing, Smoke-Free Nova Scotia is not only stressing the importance of supporting Bill 233 with no reservations, but encouraging future vaping controls to ensure that youth and adult non-smokers are protected against vaping and smoking. Furthermore, we believe that adult smokers should have the right supports to access evidence-based smoking cessation methods, such as counselling, prescription drugs, and nicotine replacement therapies, while having the inadvisable option of vaping available as a last resort if these other methods fail.

In closing, Nova Scotian youth protection is warranted and I urge you to adopt Bill 233.

Mohammed Al-Hamdani, PhD

Executive Director, Smoke-Free Nova Scotia

Nova Scotia Legislature
Standing Committees – Law Amendments
Red Chamber
2nd Floor, Province House
1726 Hollis Street
Halifax

March 5, 2020

RE: Bill 233 – Smoke Free Places Act (amended) and Tobacco Access Act (amended)

Please accept this submission as my opposition to the Law Amendments proposed for Bill 233: Smoke Free Places Act (amended) and Tobacco Access Act (amended). I would be honoured to take this opportunity to share my story, views and experiences with vaping personally, as a front line health care worker and health and safety advocate.

I grew up in the Halifax Regional Municipality and have worked in the health care system in different capacities (home care, long term care etc). Currently, I live in Ontario working in one of the busiest emergency departments in the province. It is clear to see how the detriments of smoking cigarettes weighs down our overburdened health care system, both in their long and short term effects; so why not offer countless, affordable options to our patients and loved ones to encourage smoking cessation?

At approximately \$20.00 per pack, smoking can be extremely costly, especially when we already know that many smokers are our most vulnerable people. I acknowledge that there are over the counter products available such as nicotine gum, inhalers or patches but as someone who has tried to quit smoking before, these products for the most part taste the same and just don't give the freedom and choices that vaping provides.

It seems as though vape devices and flavour options have transformed rapidly as they've grown in popularity, but is it a new concept? There seems to be a bit of discrepancy in who put forward the first ecigarette but were introduced in the early 2000's. From the small, somewhat unreliable pens that were available twenty years ago, the market is now full of options to those who would like to try to quit smoking. What I personally like is the choices I am offered to better my health and quit smoking, whether it be the choice of nicotine gum, prescriptions, patches or vaping. Just like at the pharmacy, my local vape stores have knowledgeable and educated staff who can consult and give you advice on how to quit smoking safely, effectively, and most importantly affordably.

We know that quitting smoking isn't a cookie cutter solution for all, this is why I support flavoured ejuice. There are thousands of flavours available to adults so I can also understand the government hesitation in having many products available to Nova Scotians and not have them regulated in some way. Through research available in health related peer reviewed

journals, I took the time to pour over information about what other hospitals and health care systems were doing in regards to vaping and their views on it. The UK has taken a much different approach than we have here in Canada on our views on vaping that I urge you to consider; instead of ejuice being categorized and regulated as tobacco, rather it is regulated as a nicotine harm reduction product. There are even instances of vape shops opened right on hospital grounds to encourage adults to stop smoking. As a member of a hospital Joint Health and Safety Committee I had several questions about this initiative, mostly about air quality because most hospitals are totally smoke free zones on the entire property. Again, I urge you to look into this information, there is no indication that air quality is affected and has any detrimental effects to the patients living or staying inside the hospitals, as well as those entering or exiting the hospital grounds.

Thank you for your time and consideration in amendments to this Bill.

Respectfully submitted,

Rose Mary Buote

My name is Mike Meathrel, I am the President of Dvine Laboratories and the Chairman of the Vaping Industry Trade Association or VITA.

Dvine Laboratories is one on Canada's largest e-Liquid contract packaging facilities where we manufacturer for many Canadian brands and produce over 150,000 unique SKUs. Of those SKUs, approximately 10-15,000 are some form of tobacco flavour. This will become more relevant later in my message.

I would like to start by recognizing the Nova Scotia government's well-founded efforts in addressing youth vaping in this province. It is clear that this is a problem that must be addressed. But it must be addressed sensibly, without creating further unintended harm.

The blanket prohibition on flavoured e-cigarettes set to come into force on April 1, 2020 will create several harmful consequences, including:

- depriving adult smokers of a well-recognized harm reduction mechanism;
- driving individuals back to combustible tobacco; and
- facilitating a black market.

Nova Scotians that have quit smoking or are transitioning from smoking with the use of vaping products are being ignored through this approach. We have thousands of customers that rely on the flavour of their vaping products to keep them away from combustible tobacco. Flavoured e-liquid is recognized as a key element in successfully transitioning from smoking.

Flavoured products available in adult-only, speciality vape shops and other channels such as Convenience Stores offer smokers looking to transition away from cigarettes or quit with a significantly less harmful option.

A recent publication in the journal of Science raises concerns that vaping bans could take away an important smoking-cessation tool. The publication also points to studies that demonstrate that vaping is a valuable tool for smokers trying to quit.

In contrast, there is no evidence available to support that a blanket prohibition on flavoured e-cigarettes is necessary to combat youth uptake.

With respect to the amendments before the Committee today, the term 'characterizing flavour' is complicated by variable sensitivity among the population in detecting flavour chemicals and variability in odour potency.

Further, the legislation as amended purports to allow the sale of tobacco flavoured e-cigarettes.

It is scientifically impossible to replicate combustible tobacco scent or flavour before during or after use with e-liquids. There is no industry standard for tobacco flavoured e-liquid. As noted, approximately 10-15,000 of Dvine's SKU's are some form of tobacco flavour.

Tobacco flavoured e-liquids are essentially placebo flavourings created from food flavours. Tobacco flavoured e-liquid may be derived from food additives such as, caramel, floral, nuts, maples, sweeteners, custards, vanillas, butterscotch, fruits and many more.

"Please Note" these flavours have and never can taste or smell like combustible tobacco. We are comparing 2 separate Nicotine Delivery Systems. One is combustion and the other is aerosol or steam to put this in more relative terms.

We urge the Nova Scotia government to follow the example of their provincial counterparts in British Columbia, Ontario, and Alberta by ensuring that new regulations and standards are based on the best available evidence as well as robust consultation with a diversity of stakeholders.

This is an opportunity for the government to pause and develop targeted public policy and regulatory processes that address the spike in youth uptake.

We need to ensure that we avoid another public health crisis by driving a whole new cohort of smokers and reformed smokers back to combustible tobacco or the dangerous and unregulated black market.

The amendments place at risk the rights and liberties of Nova Scotians with respect to their freedoms to choose safer alternatives to smoking combustible tobacco.

There are paths forward that safeguard our youth, while also protecting those who legitimately rely on flavour e-cigarettes as a tobacco-cessation tool. The amendments fail to achieve these twin objectives. We urge the government's reconsideration of its blanket prohibition on flavoured e-cigarettes.

I would like to thank you for your time today and we look forward to working with you on future regulations and I would be happy to answer any questions.

Good Afternoon,

March 4, 2020

I first want to start off by saying thank you for accepting my request to speak on behalf of my company, FOV Labs Inc, and the thousands of customers who rely on us every day to supply them with high quality, ISO7 lab made and tested e-liquid.

I founded FOV Labs in 2016 after being a 10yr smoker. I grew up my entire life watching my mother struggle with addiction to combustible tobacco. That addiction took a major toll on her health at the ripe young age of 42yrs old when she had the first of her many strokes. My mother is now 59yrs old and just last month, I had to convince her to move into an assisted living home. She's been thru 2 heart attacks, 1 quadruple by-pass open heart surgery and 7 strokes. She is now legally blind in her left eye and can no longer walk by herself without a walker due to the paralysis from her most recent stroke.

Even after watching her struggles, I too became addicted to combustible tobacco and scaled my addiction to 2 packs of cigarettes a day. I knew it was bad for me but did so anyway. My 20's were spent with a cigarette hanging from my lips. When I tried to quit I chose nicotine patches which gave me severe mood swings and Champix, to which the side effects were worse than smoking. Suicidal thoughts and severe stomach pains were nearly unbearable, so I chose the lesser of two evils and continued to smoke.

On my 30th birthday I decided to give this vaping thing a try. I started with what most started out with, an AIO pen style vape and 24mg of blue raspberry mango flavoured e-liquid. The first few weeks I kept a pack with me at all times because I didn't believe that vaping would help. I found myself reaching for my vape after every cigarette to change the taste of dirty ash in my mouth and replace it with the blue raspberry mango that I had grown to love. Finally, after two weeks I asked myself why I was continuing to spend money on cigarettes if I preferred the taste of the e-liquid. That was my first day completely off cigarettes and where I finally broke the chains of addiction. I had done something that my mother tried doing for 45yrs. Within a few months I felt like a brand-new man. My energy levels were up again and the shortness of breath I once had was gone. Don't let this image fool you, I may be a bit overweight and stressed to the max, but I feel a million times better than when I smoked!

After a year of vaping I discovered how to make e-liquid and ran with the idea. My mission was now to help every single adult smoker I could find. I wanted, and still do, to help people quit smoking and experience its liberating effects much as I did. It's my passion, just like many business owners and vapers who spoke here today. My business flourished because of its business model and its core values.

You see, vaping in its entirety was built by people like myself and my colleagues here today who are better known as the grass roots industry. We poured our hearts and souls into our businesses. We sacrificed everything to help others avoid the fate my mother and many like her have faced. Long hours, doubt, financial burdens and more stress than a human being should have to endure... All in the name of helping others quit combustible tobacco and its death sentence. 48000 Canadians die each year from combustible tobacco. 1 in 2 of its users will suffer the same fate my mother has and that's why we are here today.

The sad reality is that our industry is in jeopardy right now. Its facing some of the most stringent regulations the world has ever seen. To compile a 0.50 cent per ml tax on top of a flavour ban is to completely burry the market. A juice bottle that normally cost 40\$ will now cost 100\$. Increasing its price by 150%. Something that is completely unheard of in any other market in the world. A pack of cigarettes is roughly 20\$ and last you a day. A 30ml bottle of e-liquid which will last the same amount of time, will now cost 30\$. With this model cigarettes now become more attractive and completely undermines the harm reduction values of vaping.

The projections on this new tax are 2.3 million dollars in revenue. I stand here today to tell you that if this structure of banning flavours and adding a per mL tax is allowed to go thru, there will be no tax revenue coming from it because the entire market will be wiped out completely. I ask you, why would a current smoker even consider vaping if the product is more expensive and taste as bad, if not worse than cigarettes due to its bitter taste.

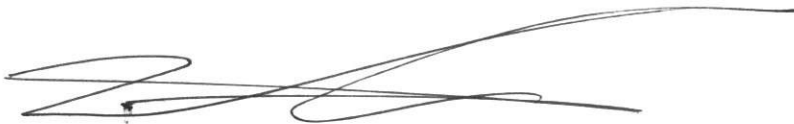
The flavours are what kept me off cigarettes much like so many adult vapers right this minute. Of all the vapers present in this room today less than 5% of them are vaping a tobacco flavour and even less are vaping flavourless. Roughly 4% of our sales come from tobacco and flavourless. The vast majority of vapours choose fruity flavour. In fact, the vast majority represents 56%. The rest choose creams, custards and bakery flavours. Taste is subjective and part of what makes Vaping such an effective tool for adults is the ability to find a flavour you like and stick with it. That's what makes vaping 3x more effective than any other NRT on the market. Banning flavours in this province will only help a massive flavoured e-liquid black-market flourish and if you've been following the news in the states you would know that the entire Evali scare was a product of Black Market THC Carts. This was confirmed by the CDC months ago. It seems counterproductive to set these stringent regulations to only create an entire un regulated black market that will work against your efforts.

Many moons ago we saw the United States apply a parental advisory sticker to all explicit CD's to hit the market. That sticker was like a billboard for teenagers saying listen to me!!! Those artists exploded in popularity. Their music became glorified. The same is true about vaping in its entirety. If we treat vaping as a taboo subject and keep pushing a narrative that its bad for you it will only increases its appeal. We should be enforcing the TVPA and being stricter on offenders. Vaping should be marketed like it is in the UK who push fact-based science on its population and educates their teens about its harm reduction value to smokers. We should be constantly repeating. If you don't smoke don't vape. If you don't vape don't start.

I agree that youth uptake should be addressed and there needs to be clear regulations on that subject. All I ask is that we are consulted so that we can help you solve the problem. If we had agricultural problems, we would talk to farmers wouldn't we. Let us help you create balanced regulations that keep our products out of the hands of youth and allows adults smokers to have access to a harm reduction product that is 95% safer than combustible tobacco according to the Royal College of Physicians and Public Health England. Let's keep the small business owners operational and squash youth vaping.

To summarise, if this is allowed to go thru many businesses will shut down in NS and it's a crying shame to think of, due to the sheer passion this industry was founded on. Current vapers and current smokers will be left with no option other than returning or continuing to use combustible tobacco because of its high price and lack of palatable taste. Nova Scotians will be forced to choose a product that is a death sentence. Lastly, with this structure a massive flavoured e-liquid black market will grow exponentially creating untested products. I implore you to do the right thing and please take the time to read the documents that I have provided. In them you will find our manufacturing processes, E-Liquid test results, a study on flavour variability by Dr, Farsalinos and a study on Harm Minimization and Tobacco Control by Dr. Abrams.

I thank you for your time and look forward to possibly working with you in order to resolve the issues.

A handwritten signature in black ink, appearing to read 'Charles Byram', with a long horizontal flourish extending to the right.

Charles Byram
CEO & Founder
FOV Labs Inc.
cbyram@fovlabs.ca
1(506)380-2270 (Cell)

Fogged Out Vapes

144 Edinburgh Dr., Door 12, Moncton, NB E1E 2K7

e-Liquid Samples

Summary Report
(FV06-26-18)



Dvine Laboratories, Inc

Phone: 905-233-2486 / www.dvinelabs.biz
423 Highway 36 Lindsay, ON K9V 4R3

This report shall not be reproduced except in full, or without written approval by the laboratory.

I certify that to the best of my knowledge all analytical data presented in this report:

- Has been reviewed for completeness and accuracy
- Is legible and free of errors
- Has been conducted in conformity with approved agreement

Prepared in PDF format by Dvine Laboratories



Signature

Review Performed by:

Rachel Longwell

Report issued:

June 26, 2018

This report shall not be reproduced except in full, or without written approval by the laboratory.

Summary of Results

This report shall not be reproduced except in full, or without written approval by the laboratory.



Test Results

Report For: Fogged Out Vapes
Job #: FV06-26-18
Sample Type: E-Liquid

Project Start Date: See original reports
Analysis Methods: GC/FID
Method Deviations: None

Dvine Code	Client Code	Diacetyl (ug/mL)	2,3 Pentanedione (ug/mL)	Original Report ID
1220-001	Bliss	ND	ND	FV12-20-17
1220-001	Blue Rancher	ND	ND	FV12-20-17
1220-001	Cookie Monster	ND	ND	FV12-20-17
1220-001	Desserted	ND	ND	FV12-20-17
1220-001	Fundy Fog	ND	ND	FV12-20-17
1220-001	Grapple	ND	ND	FV12-20-17
1220-001	Green Rancher	ND	ND	FV12-20-17
1220-001	Jacked Up	ND	ND	FV12-20-17
1220-001	Lady B's Lemonade	ND	ND	FV12-20-17
041218-002	Lust	ND	ND	FV04-12-18
1220-001	Mrs. Perry Roll	ND	ND	FV12-20-17
1220-001	Salty Sea Dog	ND	ND	FV12-20-17
041218-004	Serenity	ND	ND	FV04-12-18
1220-001	Sinful	ND	ND	FV12-20-17
062118-001	'Stachio	ND	ND	FV06-21-18
1220-001	Winters Passion	ND	ND	FV12-20-17
1220-001	WTF!?	ND	ND	FV12-20-17

These results only apply to the samples tested

Notes: NA - Non-Applicable, ND - Non-Detected

This report shall not be reproduced except in full, or without written approval by the laboratory.

Narrative Summary

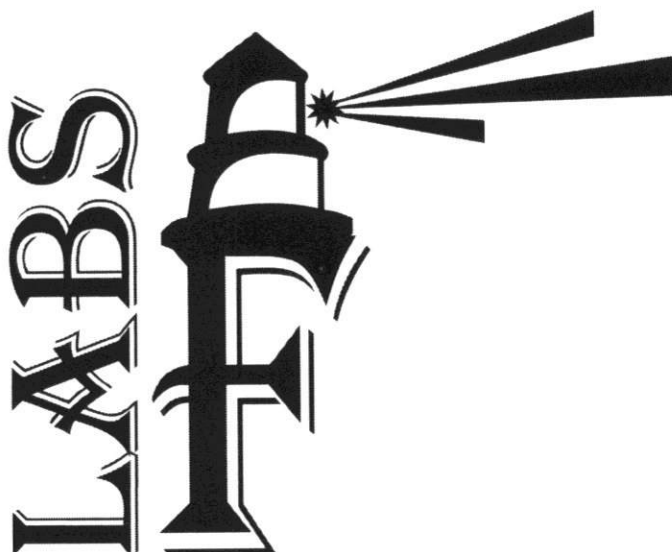
This report shall not be reproduced except in full, or without written approval by the laboratory.

Dvine Laboratories Narrative Summary

Client	Fogged Out Vapes
Analyst(s)	RL
Parameters	GC/FID Analysis
Job #	FV06-26-18
# Samples	17
Analysis	<p>The samples were analyzed for diacetyl and 2,3-pentanedione (aka acetyl propionyl) following the following procedures:</p> <ul style="list-style-type: none">- WI-004 preparation of E-Liquids for GC/FID Analysis- WI-007 Test Sampling Plan, Procedure, and Handling- WI-019 Method for Detection of Diketones in E-Liquid
Reporting Notes	<p>This report is a summary of the total reports created for Fogged Out Vapes. Original Reports are available upon request.</p> <p>The results presented in this report are representative of the samples and/or sample recipes as provided to the laboratory.</p>

**This Is the Last Page of Report FV06-26-18
by Dvine Laboratories**

This report shall not be reproduced except in full, or without written approval by the laboratory.



Receiving Inspection #370

Generated by Charles Byram on March 4th,
2020 8:00 pm UTC

Status

Closed

Requested Arrival Date

February 27th, 2020

Actual Arrival Date

February 27th, 2020

Supplier

The Flavor
Apprentice

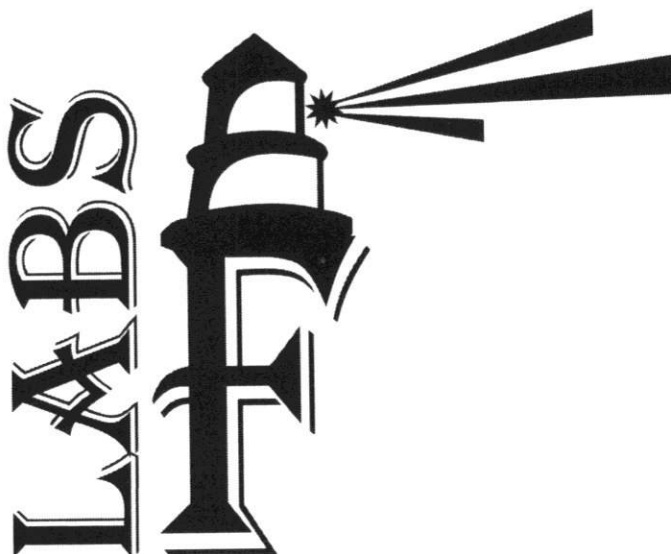
PO #

Lot Serial #

Notes

There were no notes for this receiving inspection.

<u>Part</u>	<u>Serial #</u>	<u>Juice Inspection Criteria</u>	<u>Qty Accepted</u>	<u>Qty Rejected</u>
TFA- Jack Fruit	56977	Receiving Inspection - Flavour Concentrates 0	3785.00000000 ml	0.00000000 ml
TFA- Dragon Fruit	A55554	Receiving Inspection - Flavour Concentrates 0	3785.00000000 ml	0.00000000 ml
TFA- Strawberry Ripe	B56225	Receiving Inspection - Flavour Concentrates 0	3785.00000000 ml	0.00000000 ml
TFA- Sour 20%	A55593	Receiving Inspection - Flavour Concentrates 0	3785.00000000 ml	0.00000000 ml
TFA- Watermelon	A55754	Receiving Inspection - Flavour Concentrates 0	3785.00000000 ml	0.00000000 ml



Inspection #11415

Generated by Charles Byram on March 4th, 2020 8:32 pm
UTC

Acceptance Threshold

100%

Part

Jacked Up 3mg

Status

Passed

Lot Serial #

0228201ANC

Quantity Accepted

19200.00000000 ml

Defect Summary

There were no defects logged for this inspection.

Batch Records

Jacked Up 3mg	0228201ANC	
Jacked Stone	022720ST2	3840 ml
Nicotine	011020-PG100	576 ml
PG	71128	960 ml
VG	G180318-1W	13824 ml

Notes

There were no notes for this inspection.

Sample #1 - 0228201ANC

Passed

Inspected by

CB

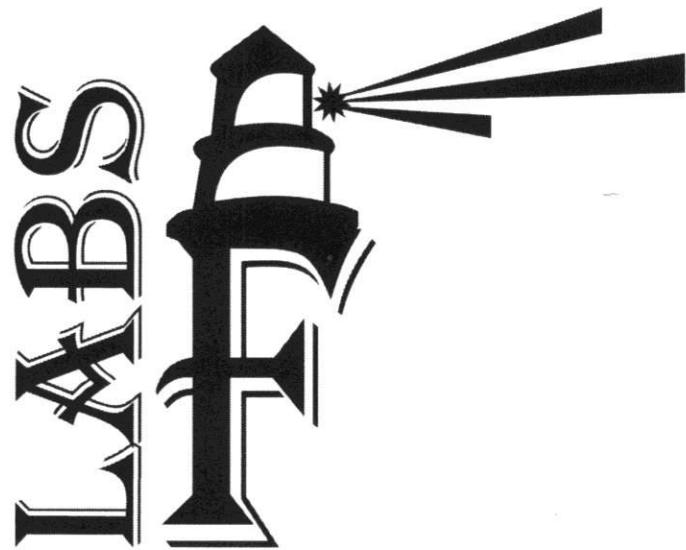
Inspected on

February 28th, 2020

8:27 am

Results

<u>Characteristic</u>	<u>Operation</u>	<u>Criteria</u>	<u>Value</u>	<u>Signatures</u>	<u>Method / Equipment</u>
Label Quality	Straight, Art, Mg Strength	(Pass/Fail)	Passed		
Product Characteristics	Smell, Look, Debris	(Pass/Fail)	Passed		
Retain Sample Kept	Retain Sample	(Pass/Fail)	Passed		
Cross Referencing	Scale Reading to Recipe	(Pass/Fail)	Passed		
Batch # Assigned	Label Applied to Container	(Pass/Fail)	Passed		
Inspection Label	Applied to Container	(Pass/Fail)	Passed		
Storage	In proper Location	(Pass/Fail)	Passed		



Inspection #11607

Generated by Charles Byram on March 4th, 2020 8:28 pm
UTC

Acceptance Threshold	
100%	

Part
OHW 30mL 10mg Salts

Status
Passed

Lot Serial #

0127201FZS

Quantity Accepted

6.00000000 units

Defect Summary

There were no defects logged for this inspection.

Batch Records

#FS-OHW030-10 - OHW 30mL 10mg Salts 0127201FZS

White Label#50-10mg Salts 0127201FZS

180 ml

#BTL-CHBB-BK-030 - Chubby 30 Black CA

6 units

Notes

There were no notes for this inspection.

Sample #1 - 0127201FZS

Passed

Inspected by

MThibodeau

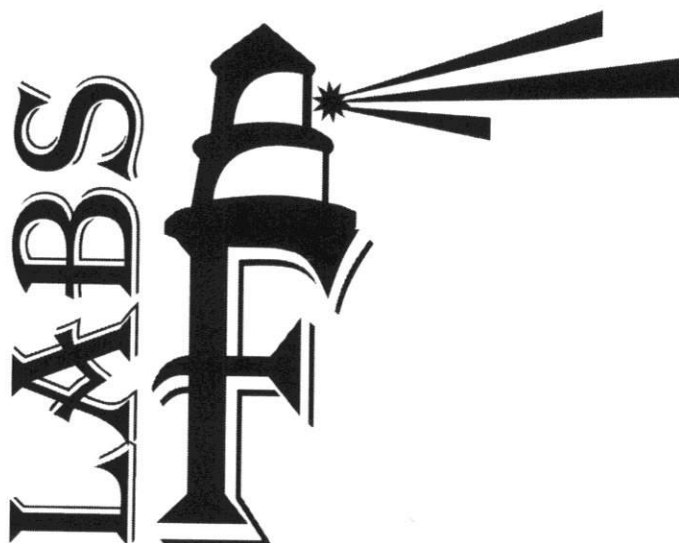
Inspected on

March 4th, 2020

10:58 am

Results

<u>Characteristic</u>	<u>Operation</u>	<u>Criteria</u>	<u>Value</u>	<u>Signatures</u>	<u>Method / Equipment</u>
Inner Cap	Clean, Seated, Cracks	(Pass/Fail)	Passed		
Bottle	Clean, Leaks, Tightened	(Pass/Fail)	Passed		
Outer Cap	Clean, Seated, Tightened	(Pass/Fail)	Passed		
Leaks	***BOTTOM***, Cap	(Pass/Fail)	Passed		
Labels	Straight, Centred, Art, Mg Strength	(Pass/Fail)	Passed		
Amount	Filled to Correct Amount	(Pass/Fail)	Passed		



Shipment #FL5663

Generated by Charles Byram on March 4th, 2020 8:08 pm
UTC

Status

Closed

Requested Ship Date

March 4th, 2020

Actual Ship Date

March 6th, 2020

Customer

Tyler Homans

PO #

FL5663

Notes

There were no notes for this shipment.

<u>Part</u>	<u>Serial #</u>	<u>Juice Inspection</u> <u>Criteria</u>	<u>Qty</u>
asylum 30ml 48mg salts	0219201SKS	Bottling QA 2	2.00000000 units
sanitarium 30ml 48mg salts	0210201SKS	Bottling QA 2	1.00000000 units
straight jacket 30ml 50mg salts	0211202SKS	Bottling QA 2	1.00000000 units
Unhinged 30ml 48mg salts	1113195SKS	Bottling QA 2	1.00000000 units

Article

Impact of Flavour Variability on Electronic Cigarette Use Experience: An Internet Survey

Konstantinos E. Farsalinos ^{1,*}, Giorgio Romagna ², Dimitris Tsiapras ¹, Stamatis Kyrzopoulos ¹, Alketa Spyrou ¹ and Vassilis Voudris ¹

¹ Onassis Cardiac Surgery Center, Sygrou 356, Kallithea 17674, Greece;
E-Mails: dtsiapras@hotmail.com (D.T.); stkyrz@gmail.com (S.K.); aspirou@gmail.com (A.S.); vvoudris@otenet.gr (V.V.)

² ABICH S.r.l, Biological and Chemical Toxicology Research Laboratory, Via 42 Martiri, 213/B-28924 Verbania (VB), Italy; E-Mail: giorgio.romagna@gmail.com

* Author to whom correspondence should be addressed; E-Mail: kfarsalinos@gmail.com;
Tel.: +306-977-454-837; Fax: +302-109-493-373.

Received: 19 November 2013; in revised form: 11 December 2013 / Accepted: 12 December 2013 /
Published: 17 December 2013

Abstract: *Background:* A major characteristic of the electronic cigarette (EC) market is the availability of a large number of different flavours. This has been criticised by the public health authorities, some of whom believe that diverse flavours will attract young users and that ECs are a gateway to smoking. At the same time, several reports in the news media mention that the main purpose of flavour marketing is to attract youngsters. The importance of flavourings and their patterns of use by EC consumers have not been adequately evaluated, therefore, the purpose of this survey was to examine and understand the impact of flavourings in the EC experience of dedicated users. *Methods:* A questionnaire was prepared and uploaded in an online survey tool. EC users were asked to participate irrespective of their current smoking status. Participants were divided according to their smoking status at the time of participation in two subgroups: former smokers and current smokers. *Results:* In total, 4,618 participants were included in the analysis, with 4,515 reporting current smoking status. The vast majority (91.1%) were former smokers, while current smokers had reduced smoking consumption from 20 to 4 cigarettes per day. Both subgroups had a median smoking history of 22 years and had been using ECs for 12 months. On average they were using three different types of liquid flavours on a regular basis, with former smokers switching between flavours more

frequently compared to current smokers; 69.2% of the former subgroup reported doing so on a daily basis or within the day. Fruit flavours were more popular at the time of participation, while tobacco flavours were more popular at initiation of EC use. On a scale from 1 (not at all important) to 5 (extremely important) participants answered that variability of flavours was “very important” (score = 4) in their effort to reduce or quit smoking. The majority reported that restricting variability will make ECs less enjoyable and more boring, while 48.5% mentioned that it would increase craving for cigarettes and 39.7% said that it would have been less likely for them to reduce or quit smoking. The number of flavours used was independently associated with smoking cessation. *Conclusions:* The results of this survey of dedicated users indicate that flavours are marketed in order to satisfy vapers’ demand. They appear to contribute to both perceived pleasure and the effort to reduce cigarette consumption or quit smoking. Due to the fact that adoption of ECs by youngsters is currently minimal, it seems that implementing regulatory restrictions to flavours could cause harm to current vapers while no public health benefits would be observed in youngsters. Therefore, flavours variability should be maintained; any potential future risk for youngsters being attracted to ECs can be sufficiently minimized by strictly prohibiting EC sales in this population group.

Keywords: electronic cigarette; flavours; smoking; tobacco; nicotine; smoking cessation; public health

1. Introduction

Cigarette smoking is considered the single most preventable cause of disease, affecting several systems in the human body and causing premature death [1]. The World Health Organisation predicts more than 1 billion deaths within the 21st century related to tobacco cigarettes [2]. Although there is overwhelming evidence for the benefits of smoking cessation [3], it is a very difficult addiction to break. Currently available nicotine replacement therapy have low long-term success rate, which may be attributed solely to psychological support [4], while oral medications are more effective [5] but are hindered by reports of adverse neuropsychiatric effects [6]. In this context, the tobacco harm reduction strategy has been developed, with a goal of providing nicotine through alternative methods in order to reduce the amount of harmful substances obtained by the user [7].

Electronic cigarettes (ECs) have been marketed in recent years as alternative to smoking products. They consist mainly of a battery and an atomiser where liquid is stored and gets evaporated by energy supplied to an electrical resistance. The liquid contains mainly propylene glycol and glycerol, with the option to include nicotine. A major characteristic of the EC liquid market is the availability of a variety of flavourings. Besides tobacco-like flavours, the consumer can choose flavours consisting of fruits, sweets, drinks and beverages and many more. The availability of so many flavours has been criticized by authorities such as the Food and Drug Administration (FDA), stating that there is a potential to attract youngsters [8]. Such a concern was probably raised by the experience with tobacco products, with studies showing that flavoured cigarettes were more appealing to young users [9]. A recent survey

of electronic cigarette users found that almost half of participants were using non-tobacco flavours [10]. However, no survey was specifically designed to detect the impact of flavourings on EC experience by users. Therefore, the purpose of this survey was to evaluate the patterns of flavourings use and determine their popularity in a sample of dedicated adult EC users.

2. Methods

A questionnaire was prepared by the research team in two languages (English and Greek) and was uploaded in an online survey tool (www.surveymonkey.com). A brief presentation of the survey was uploaded in the website of a non-profit EC advocates group (www.ecigarette-research.com) together with informed consents in English and Greek. If the participant agreed with the informed consent, he was redirected to the questionnaire in the respective language by pressing the “I agree” button. The survey was available online for 15 days. The protocol was approved by the ethics committee of our institution.

EC users of any age, irrespective of current or previous smoking status, were asked to participate to the survey. The survey was communicated in internet social media and several EC users’ forums and advocate groups worldwide. The IP address of the participants was recorded in order to remove double entries. There was an option for participants to report their email address for participation in future projects; unwillingness to report the email address was not a criterion for exclusion from the survey. Information about age, gender, country of residence and education level was requested. Past and present smoking status was asked and, based on the latter, participants were divided into two groups for the analysis: former smokers who had completely quit smoking and smokers who were still smoking after initiation of EC use. The questionnaire included questions about the type of flavours used regularly by the participants, whether the variety of flavourings was important in reducing or completely substituting smoking and defining the reasons for using multiple flavours. To assess difficulty in finding flavours of their preference at EC use initiation, the following question was asked: “Was it difficult to find the flavourings of your preference at initiation of EC use?”. The answers were scored as: 1, “not at all difficult”; 2, “slightly difficult”; 3, “difficult”; 4, “very difficult”; and 5, “extremely difficult”. To examine the importance of flavours variability in reducing or quitting smoking, the following question was asked: “Was the variability of flavourings important in your effort to reduce or completely substitute smoking?”. The answer was scored as: 1, “not at all important”; 2, “slightly important”; 3, “important”; 4, “very important”; and 5, “extremely important”.

3. Statistical Analysis

Participants were categorised into current smokers and former-smokers according to their reported status at the time of participation to the survey. Results are reported for the whole sample and for each of the subgroups. The sample size varied by variable because of missing data. In some questions, responders were allowed to choose more than one option; in these cases, each answer is presented separately and the sum of responses may exceed 100%. Kolmogorov-Smirnoff tests were performed to assess normality of distribution of variables. Continuous variables are reported as median (interquartile range [IQR]). Categorical variables are reported as number (percentage). Mann Whitney U test was used to compare continuous variables between current and former smokers, while cross tabulations with χ^2 test were used for categorical variables. Finally, a stepwise binary logistic regression analysis

was performed, with smoking status (former vs. current smoker) as the independent variable and age, gender, education level, smoking duration, number of flavourings used regularly, and EC consumption (ml liquid or number of prefilled cartomisers) as covariates. A two-tailed P value of <0.05 was considered statistically significant, and all analyses were performed with commercially available statistical software (SPSS v. 18, Chicago, IL, USA).

4. Results

4.1. Baseline Characteristics

After excluding double entries, 4,618 participants were included to the analysis, with 4,515 reporting current smoking status (current vs. former smokers). The baseline characteristics of the study group and subgroups are displayed in Table 1. More than 90% were former smokers. The mean age was 40 years, with male predominance. No difference between former and current smokers was observed in age, while more males were former smokers. The vast majority were from America and Europe, with a small proportion residing in Asia and Australia. More than half of participants were educated to the level of university/college. Smoking duration was similar between subgroups. Interestingly, former smokers reported higher daily cigarette consumption before initiation of EC use, although the difference was not statistically significant. Current smokers reported a substantial reduction in cigarette consumption, from 20 to 4 cigarettes per day. The median duration of EC use was 12 months, with higher consumption (ml liquid or number of cartridges) reported by former smokers. Higher nicotine concentration liquids were used by current smokers ($P = 0.005$). In total, 140 participants (3.0%) reported using non-nicotine liquids, 2.8% of former and 1% of current smokers ($\chi^2 = 4.5$, $P = 0.033$); 21 users of non-nicotine liquids did not mention their current smoking status. Finally, more current smokers were using first (cigarette-like) and second generation (eGo-type) devices while more former smokers were using third generation devices (also called “Mods”, variable voltage or wattage devices).

4.2. Perceptions in Relation to Flavours

Responses to questions related to flavours are displayed in Table 2. At the time of participation, most commonly used flavours were fruits, followed by sweets and tobacco. Significant differences were observed between subgroups. Characteristically, more current smokers were using tobacco flavours compared to former smokers, while more of the latter were using fruit and sweet flavours. On a regular basis, participants reported using 3 (IQR: 2–4) different types of flavours. At initiation of EC use, most popular flavours were tobacco followed by fruit and sweet flavours. The median score for difficulty to find the flavours of their preference at EC initiation was 2 (IQR: 1–3), with no difference between subgroups. Most participants (68.3%) were switching between flavours on a daily basis or within the day, with former smokers switching more frequently. More than half of the study sample mentioned that they like the variety of flavours and that the taste gets blunt from long-term use of the same flavour. The average score for importance of flavours variability in reducing or quitting smoking was 4 (“very important”). Finally, the majority of participants stated that restricting variability of flavours would make the EC experience less enjoyable while almost half of them answered that it

would increase craving for tobacco cigarettes and would make reducing or completely substituting smoking less likely.

Table 1. Baseline characteristics of the study population and subgroups.

Characteristic	Total	Former Smokers	Current Smokers	Statistic	P
Participants, n (%)	4,618	4,117 (91.2)	398 (8.8)		
English translation	4,386 (95.0)	3,915 (95.1)	369 (92.7)		
Greek translation	232 (5.0)	202 (4.9)	29 (7.3)		
Region of residence, n (%)					
America	2,220 (48.5)	2,007 (48.7)	157 (39.4)		
Asia	76 (1.7)	58 (1.4)	16 (4.0)		
Australia	80 (1.7)	75 (1.8)	4 (1.0)		
Europe	2,197 (48.0)	1,939 (47.1)	217 (54.5)		
Education, n (%)					
High school or less	1,037 (22.7)	917 (22.3)	98 (24.6)		
Technical Education	1,099 (24.1)	993 (24.1)	86 (21.6)		
University/College	2,425 (53.2)	2,170 (52.7)	206 (51.8)		
Age (years)	40 (32–49)	40 (32–49)	40 (32–49)	U = 754,278	0.624
Gender (male)	3,229 (71.8)	2,922 (72.7)	246 (62.5)	$\chi^2 = 18.0$	<0.001
Smoking duration (years)	22 (15–30)	22 (15–30)	22 (14–30)	U = 816,534	0.924
Cigarette consumption before EC use (/d)	24 (20–30)	25 (20–30)	20 (19–30)	U = 768,398	0.189
Cigarettes consumption after EC use (/d)			4 (2–6)		
EC use duration (months)	12 (6–23)	12 (6–23)	12 (5–23)	U = 790,219	0.373
EC consumption (ml or cartridges/d)	4 (3–5)	4 (3–5)	3 (2–5)	U = 677,862	<0.001
Nicotine levels in EC (mg/ml)	12 (6–18)	12 (6–18)	12 (8–18)	U = 722,563	0.005
EC devices used, n (%)					
Cigarette-like	84 (1.8)	61 (1.5)	20 (5.0)	$\chi^2 = 25.9$	<0.001
eGo-type	1,123 (24.7)	966 (23.5)	133 (33.4)	$\chi^2 = 19.5$	<0.001
“Mods” ^a	3,348 (73.5)	3,047 (74.0)	237 (59.5)	$\chi^2 = 38.3$	<0.001

Notes: Values presented as median (interquartile range) or number (percentage). Abbreviations: EC, electronic cigarette. ^a New generation devices, usually hand-made or with the ability to manually set the voltage or wattage delivery.

Table 2. Patterns of flavourings use in the study population and subgroups.

Characteristic	Total	Former Smokers	Current Smokers	Statistic	P
Flavours used now, n (%) ^a					
Tobacco	1,984 (43.9)	1,773 (43.1)	211 (53.0)	$\chi^2 = 14.6$	<0.001
Mint/menthol	1,468 (31.8)	1,339 (32.5)	129 (32.4)	$\chi^2 = 0.0$	0.964
Sweet	2,836 (61.4)	2,629 (63.9)	207 (52.0)	$\chi^2 = 21.8$	<0.001
Nuts	691 (15.0)	643 (15.6)	48 (12.1)	$\chi^2 = 3.5$	0.060
Fruits	3,203 (69.4)	2,953 (71.7)	250 (62.8)	$\chi^2 = 14.0$	<0.001
Drinks/beverages	1,699 (36.8)	1,562 (37.9)	137 (34.4)	$\chi^2 = 1.9$	0.167
Other	1,028 (22.3)	946 (23.0)	82 (20.6)	$\chi^2 = 1.2$	0.281

Table 2. Cont.

Flavours used at EC initiation, n (%) ^a					
Tobacco	3,118 (69.1)	2,846 (69.1)	272 (68.3)	$\chi^2 = 0.1$	0.746
Mint/menthol	1,086 (24.1)	1,004 (24.4)	82 (20.6)	$\chi^2 = 2.8$	0.092
Sweet	1,347 (29.8)	1,251 (30.4)	96 (24.1)	$\chi^2 = 6.8$	0.009
Nuts	203 (4.5)	186 (4.5)	17 (4.3)	$\chi^2 = 0.1$	0.821
Fruits	1,743 (38.6)	1,606 (39.0)	137 (34.4)	$\chi^2 = 3.2$	0.073
Drinks/beverages	808 (17.9)	748 (16.8)	60 (15.1)	$\chi^2 = 2.4$	0.124
Other	302 (6.7)	282 (6.8)	20 (5.0)	$\chi^2 = 1.9$	0.164
Switching between flavours, n (%)					
Daily/within the day	3,083 (68.3)	2,851 (69.2)	232 (58.3)	$\chi^2 = 20.1$	<0.001
Weekly	718 (15.9)	636 (15.4)	82 (20.6)	$\chi^2 = 7.2$	0.007
Less than weekly	465 (10.3)	412 (10.0)	53 (13.3)	$\chi^2 = 4.3$	0.038
At EC initiation, was it difficult to find the flavours of your preference? ^b	2 (1–3)	2 (1–3)	2 (1–3)	U = 760,068	0.054
Why do you feel the need to choose different flavours? n (%) ^a					
Like variety of choices	3,300 (73.1)	3,041 (73.9)	259 (65.1)	$\chi^2 = 14.3$	<0.001
They get “blunt” from long-term use	2,325 (51.5)	2,131 (51.8)	194 (48.7)	$\chi^2 = 1.3$	0.250
Other reasons	342 (7.6)	318 (7.7)	24 (6)	$\chi^2 = 1.5$	0.223
Was flavours variability important in reducing/quitting smoking? ^b	4 (3–5)	4 (3–5)	4 (3–5)	U = 731,547	0.455
How would your experience with EC change if flavours variability was limited? n (%) ^a					
Less enjoyable	3,111 (68.9)	2,886 (70.1)	225 (56.5)	$\chi^2 = 31.2$	<0.001
More boring	2,063 (45.7)	1,901 (46.2)	236 (40.7)	$\chi^2 = 4.4$	0.036
Increase craving for cigarettes	2,188 (48.5)	1,982 (48.1)	206 (51.8)	$\chi^2 = 1.9$	0.168
Less likely to reduce or quit smoking	1,793 (39.7)	1,617 (39.3)	176 (44.2)	$\chi^2 = 3.7$	0.054
No difference	285 (6.3)	253 (6.1)	32 (8.0)	$\chi^2 = 2.2$	0.138

Notes: Values presented as median (interquartile range) or number (percentage). Abbreviations: EC, electronic cigarette. ^a Participants were allowed to choose more than one answers. ^b Score reported (see text for details).

Binary logistic regression analysis showed that male gender ($B = 0.373$, $P = 0.001$), EC consumption ($B = 0.046$, $P = 0.044$) and number of flavours regularly used ($B = 0.089$, $P = 0.038$) were associated with complete smoking abstinence in this population of dedicated long-term vapers, while age, education level and smoking duration were not associated with smoking abstinence.

5. Discussion

This is the first survey that specifically focused on the issue of flavours and their impact in EC use. A substantial number of dedicated EC consumers participated; they reported that flavours play an important role in their EC use experience and in reducing cigarette consumption and craving, while the number of flavours regularly used was independently associated with complete smoking abstinence in this population.

The availability of a variety of flavours has been a controversial issue since the initial appearance of ECs to the market. Most companies offer a variety of flavours, from those resembling tobacco to a large

number commonly used in the food industry. Public health authorities have raised concerns about this issue, and several statements have been released suggesting flavours could attract youngsters [8,11,12]. Such concerns are probably rooted back to the marketing of the tobacco industry for flavoured tobacco cigarettes. Internal industry documents and published surveys indicated that flavoured tobacco products are more appealing to youngsters and may be a gateway to maintaining smoking as a long term habit, while use by adults was quite low [13–16]. This is the main reason why the FDA decided to implement a ban on characteristic flavours in tobacco cigarettes [17]. It was expected that such concerns would be raised for ECs, although current vapers are overwhelmingly adults. Anecdotal evidence from EC consumers' internet forums and results from surveys [10] have shown that different flavours are very popular among dedicated users. The results of this survey confirm previous observations by finding that dedicated users switch between flavours frequently and the variability of flavours plays an important role both in reducing cigarette craving and in perceived pleasure. Moreover, the number of flavours used was associated with smoking cessation. Therefore, flavours variability is needed to support the demand by current vapers, who are in their vast majority adults. This survey also indicated that there is a switch in flavours preference of EC consumers; tobacco is the preferred flavour when initiating EC use, probably because smokers are used to this flavour and feel the need to use something that resembles their experience from smoking. However, different choices are made as time of use progresses. This may be a way to distract them from the tobacco flavour in order to reduce smoking craving; alternatively, it could indicate that they just don't need the tobacco flavour any more, but feel the desire to experiment with new flavours. In some cases, tobacco flavour may even become unpleasant, especially in those who have completely quit smoking. The improvement in olfactory and gustatory senses in these people can lead to both more pleasure perceived from different flavours and an aversion to tobacco flavour (in a similar way that it is unpleasant for a non-smoker); the latter has been reported in EC consumers' forums (<http://www.e-cigarette-forum.com/forum/polls/209041-do-you-vape-tobacco-flavors.html>). Such a phenomenon may contribute to lower relapse to smoking and may prevent the EC from being a gateway to smoking; however, this should be specifically studied before making any conclusions. Finally, the issue of taste buds "tolerance", which is anecdotally mentioned by vapers, was reported by almost half of the sample as a reason to switch between flavours, although it is most probably a type of olfactory rather than gustatory tolerance.

Besides information on the use of flavourings, this survey provides information on other issues related to EC use. A small minority of participants were using first generation cigarette-like devices. This has been observed in other surveys [10]. There was a higher prevalence of third-generation devices used in the subgroup of former smokers compared to current smokers. Such devices have the ability to provide higher energy to the atomiser, thus producing more vapour and delivering more pleasure to the user [18,19]. Until now, two randomised studies evaluating the efficacy of EC use in smoking cessation have used first-generation cigarette-like devices [20,21]. It is possible that newer generation devices may be more effective in substituting smoking, and this should be evaluated in future studies. Additionally, former smokers were using lower nicotine-concentration liquids compared to current smokers. It has been observed from previous studies that EC users who have completely substituted smoking try to gradually reduce their nicotine use [18]. Despite that, only 2.8% of former smokers were using 0-nicotine liquids at the time of survey participation, indicating that nicotine is

important in smoking abstinence and that EC consumers remain long-term nicotine users. However, the possibility that several vapers may quit EC use shortly after switching to non-nicotine liquids cannot be excluded; such users would not participate to this survey, therefore overestimating the significance of nicotine on EC use. Finally, we observed a male predominance in participation to this survey, which is in line with previous studies [10,18]. In this survey, males were more likely to have completely quit smoking. Further studies are needed to explore this phenomenon and define whether females are less successful in smoking cessation with EC use, are less motivated long-term users or use ECs in the short term as smoking substitutes.

There are some limitations applicable to this study. The survey was announced and promoted in popular EC websites. Therefore, it is expected that dedicated users with positive experience with ECs would mainly participate, and the high proportion of former smokers confirms this. However, it is important to evaluate the patterns of use in smokers who have successfully quit smoking, since this can provide health officials with information on how to educate smokers into using ECs, especially during the initial period of use. Although a significant proportion stated that flavours play a major role in reducing or quitting smoking, this study was not designed to evaluate whether variability of flavours may promote smoking cessation in the general population; moreover our sample is not representative of the general population of smokers, who are generally less educated compared to the population evaluated here [22]. This should be evaluated in a randomised study. Finally, although the fact that flavours are important for existing EC users provides sufficient explanation for their current marketing, it does not exclude the possibility that they may also attract youngsters. However, currently available evidence indicates that regular use of ECs by non-smoking adults or youngsters is very limited [23–25]; thus, any restriction of flavours for the reason of protecting youngsters is currently not substantiated by evidence and no public health benefit would be derived. On the contrary, such a measure could have a negative impact and cause harm in current vapers, who are reporting that they enjoy flavours and that restrictions would make smoking reduction or cessation more difficult and would increase cigarette craving. Therefore, it would be more realistic and valuable to promote restrictions to the use of ECs by youngsters and to properly inform the public that ECs should be used only by smokers as a method to reduce cigarette consumption or completely substitute smoking.

6. Conclusions

The results of this survey indicate that EC liquid flavourings play a major role in the overall experience of dedicated users and support the hypothesis that they are important contributors in reducing or eliminating smoking consumption. This should be considered by the health authorities; based on the current minimal adoption of ECs by youngsters, it is reasonable to support that any proposed regulation should ensure that flavourings are available to EC consumers while at the same time restrictions to the use by youngsters (especially non-smokers) should be imposed in order to avoid future penetration of EC use to this population.

Acknowledgements

We would like to thank E-Cigarette Research Advocates Group for promoting the survey in their website (www.ecigarette-research.com). This is a non-profit group of electronic cigarette users with no

relation to the electronic cigarette or other industry. The website does not promote or present any electronic cigarette product and do not accept any advertisements. The sole purpose of the group is to inform about research conducted on electronic cigarettes. Konstantinos E. Farsalinos has been allowed to present studies and post comments concerning electronic cigarette research on this website, without providing or receiving any form of payment. We would also like to thank all other websites and internet forums for promoting the survey and encouraging electronic cigarette users to participate. None of the websites promoting the survey had any access to the data collected from participants. No funding was received for this study.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Doll, R.; Peto, R.; Boreham, J.; Sutherland, I. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ* **2004**, *328*, 1519–1528.
2. World Health Organisation. Tobacco fact sheet No339. Updated, July 2013. Available online: <http://www.who.int/mediacentre/factsheets/fs339/en/> (accessed on 14 November 2013).
3. Taylor, D.H.; Hasselblad, V.; Henley, S.J.; Thun, M.J.; Sloan, F.A. Benefits of smoking cessation for longevity. *Am. J. Public Health* **2002**, *92*, 990–996.
4. Moore, D.; Aveyard, P.; Connock, M.; Wang, D.; Fry-Smith, A.; Barton, P. Effectiveness and safety of nicotine replacement therapy assisted reduction to stop smoking: Systematic review and meta-analysis. *BMJ* **2009**, *338*, b1024, doi:10.1136/bmj.b1024.
5. Rigotti, N.A.; Pipe, A.L.; Benowitz, N.L.; Arteaga, C.; Garza, D.; Tonstad, S. Efficacy and safety of varenicline for smoking cessation in patients with cardiovascular disease: A randomized trial. *Circ.* **2010**, *121*, 221–229.
6. Hays, J.T.; Ebbert, J.O. Adverse effects and tolerability of medications for the treatment of tobacco use and dependence. *Drugs* **2010**, *70*, 2357–2372.
7. Rodu, B.; Godshall, W.T. Tobacco harm reduction: An alternative cessation strategy for inveterate smokers. *Harm Reduct. J.* **2006**, *3*, 37, doi:10.1186/1477-7517-3-37.
8. Food and Drug Administration. *FDA and Public Health Experts Warn About Electronic Cigarettes*; 2009. Available online: <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm173222.htm> (accessed on 14 November 2013).
9. Lewis, M.J.; Wackowski, O. Dealing with an innovative industry: A look at flavored cigarettes promoted by mainstream brands. *Am. J. Public Health* **2006**, *96*, 244–251.
10. Dawkins, L.; Turner, J.; Roberts, A.; Soar, K. "Vaping" profiles and preferences: An online survey of electronic cigarette users. *Addiction* **2013**, *108*, 1115–1125.

11. Mayers, M.L. *FDA Acts to Protect Public Health from Electronic Cigarettes. Campaign for Tobacco-Free Kids Statement*; 2009. Available online: http://www.tobaccofreekids.org/press_releases/post/id_1166 (accessed on 14 November 2013).
12. National Association of Attorneys General. *FDA Regulation on E-Cigarettes*; 2013. Available online: [http://www.naag.org/assets/files/pdf/E%20Cigarette%20Final%20Letter%20\(5\)\(1\).pdf](http://www.naag.org/assets/files/pdf/E%20Cigarette%20Final%20Letter%20(5)(1).pdf) (accessed on 14 November 2013).
13. Connolly, G.N. Sweet and spicy flavours: New brands for minorities and youth. *Tob. Control.* **2004**, *13*, 211–212.
14. Carpenter, C.M.; Wayne, G.F.; Pauly, J.L.; Koh, H.K.; Connolly, G.N. New cigarette brands with flavors that appeal to youth: Tobacco marketing strategies. *Health Aff.* **2005**, *24*, 1601–1610.
15. Klein, S.M.; Giovino, G.A.; Barker, D.C.; Tworek, C.; Cummings, K.M.; O'Connor, R.J. Use of flavored cigarettes among older adolescent and adult smokers: United States, 2004–2005. *Nicotine Tob. Res.* **2008**, *10*, 1209–1214.
16. Chung, P.J.; Garfield, C.F.; Rathouz, P.J.; Lauderdale, D.S.; Best, D.; Lantos, J. Youth targeting by tobacco manufacturers since the Master Settlement Agreement. *Health Aff.* **2002**, *21*, 254–263.
17. Food and Drug Administration. Overview of the family smoking prevention and tobacco control act. 2009. Available online: <http://www.fda.gov/downloads/TobaccoProducts/GuidanceComplianceRegulatoryInformation/UCM336940.pdf> (accessed on 14 November 2013).
18. Farsalinos, K.E.; Romagna, G.; Tsiapras, D.; Kyrzopoulos, S.; Voudris, V. Evaluating nicotine levels selection and patterns of electronic cigarette use in a group of “vapers” who had achieved complete substitution of smoking. *Subst. Abuse* **2013**, *7*, 139–146.
19. Farsalinos, K.E.; Romagna, G.; Alliffranchini, E.; Ripamonti, E.; Bocchietto, E.; Todeschi, S.; Tsiapras, D.; Kyrzopoulos, S.; Voudris, V. Comparison of the cytotoxic potential of cigarette smoke and electronic cigarette vapour extract on cultured myocardial cells. *Int. J. Environ. Res. Public Health* **2013**, *10*, 5146–5162.
20. Caponnetto, P.; Campagna, D.; Cibella, F.; Morjaria, J.B.; Caruso, M.; Russo, C.; Polosa, R. Efficiency and Safety of an eElectronic cigarette (ECLAT) as tobacco cigarettes substitute: A prospective 12-month randomized control design study. *PLoS One* **2013**, *8*, e66317, doi:10.1371/journal.pone.0066317.
21. Bullen, C.; Howe, C.; Laugesen, M.; McRobbie, H.; Parag, V.; Williman, J.; Walker, N. Electronic cigarettes for smoking cessation: A randomised controlled trial. *Lancet* **2013**, *382*, 1629–1637.
22. Centers for Disease Control and Prevention (CDC). Vital signs: Current cigarette smoking among adults aged ≥ 18 years with mental illness—United States, 2009–2011. *Morb. Mortal. Wkly. Rep.* **2013**, *62*, 81–87.
23. Dockrell, M.; Morrison, R.; Bauld, L.; McNeill, A. E-cigarettes: Prevalence and attitudes in Great Britain. *Nicotine Tob. Res.* **2013**, *15*, 1737–1744.
24. Camenga, D.R.; Delmerico, J.; Kong, G.; Cavallo, D.; Hyland, A.; Cummings, K.M.; Krishnan-Sarin, S. Trends in use of electronic nicotine delivery systems by adolescents. *Addict. Behav.* **2013**, doi:10.1016/j.addbeh.2013.09.014, published online.

25. Lee, S.; Grana, R.A.; Glantz, S.A. Electronic cigarette use among Korean adolescents: A Cross-Sectional Study of Market Penetration, Dual Use, and Relationship to Quit Attempts and Former Smoking. *J. Adolesc. Health* **2013**, doi: 10.1016/j.jadohealth.2013.11.003.

© 2013 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).

Annual Review of Public Health

Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives

David B. Abrams,¹ Allison M. Glasser,²
Jennifer L. Pearson,³ Andrea C. Villanti,⁴
Lauren K. Collins,² and Raymond S. Niaura¹

¹College of Global Public Health, New York University, New York, NY 10012, USA;
email: David.B.Abrams@nyu.edu, niaura@nyu.edu

²Schroeder Institute for Tobacco Research and Policy Studies, Truth Initiative, Washington, DC 20001, USA; email: ag6507@nyu.edu, katz.laurenk@gmail.com

³School of Community Health Sciences, University of Nevada, Reno, Nevada 89557, USA;
email: jennipearson@unr.edu

⁴Vermont Center on Behavior and Health, University of Vermont, Burlington, Vermont 05401, USA; email: andrea.villanti@uvm.edu



**ANNUAL
REVIEWS Further**

Click [here](#) to view this article's online features:

- Download figures as PPT slides
- Navigate linked references
- Download citations
- Explore related articles
- Search keywords

Annu. Rev. Public Health 2018. 39:193–213

First published as a Review in Advance on January 11, 2018

The *Annual Review of Public Health* is online at publhealth.annualreviews.org

<https://doi.org/10.1146/annurev-publhealth-040617-013849>

Copyright © 2018 David B. Abrams et al. This work is licensed under a Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See credit lines of images or other third-party material in this article for license information



Keywords

harm minimization, nicotine, e-cigarettes, smoking, tobacco

Abstract

Inhalation of the toxic smoke produced by combusting tobacco products, primarily cigarettes, is the overwhelming cause of tobacco-related disease and death in the United States and globally. A diverse class of alternative nicotine delivery systems (ANDS) has recently been developed that do not combust tobacco and are substantially less harmful than cigarettes. ANDS have the potential to disrupt the 120-year dominance of the cigarette and challenge the field on how the tobacco pandemic could be reversed if nicotine is decoupled from lethal inhaled smoke. ANDS may provide a means to compete with, and even replace, combusted cigarette use, saving more lives more rapidly than previously possible. On the basis of the scientific evidence on ANDS, we explore benefits and harms to public health to guide practice, policy, and regulation. A reframing of societal nicotine use through the lens of harm minimization is an extraordinary opportunity to enhance the impact of tobacco control efforts.

Smoking:
the inhalation of the smoke from any combustible tobacco product

Alternative nicotine delivery systems (ANDS):
noncombusted refined nicotine (e.g., e-cigarettes, heat-not-burn and other emerging products, as well as smokeless and NRT)

E-cigarettes:
also called vape pens, personal vaporizers, e-hookahs, e-pipes, and e-cigars, among other names, are battery-operated and produce an aerosol instead of smoke

Combusted/combustible tobacco:
products that burn tobacco resulting in inhalation of the resultant smoke (e.g., cigarettes, cigars, pipes, roll-your-own products, and hookah)

Harm minimization:
Reducing harm as much as possible with the ideal being zero harm

Noncombusted/noncombustible tobacco: nonburning tobacco products (smokeless tobacco, snus)

1. INTRODUCTION

The fiftieth-anniversary US Surgeon General's Report, in 2014, concluded, "The burden of death and disease from tobacco use in the U.S. is overwhelmingly caused by cigarette and other combusted tobacco products; rapid elimination of their use will dramatically reduce this burden" (117, p. 7). Globally, smoking-caused annual deaths will rise to 8 million by 2030 if current trends continue (137, 139). It is imperative to find additional ways to accelerate the decline in smoking because, if nothing changes, a billion lives will be lost prematurely by 2100 (136). Despite declines over the last 50 years, ~520,000 Americans annually die prematurely from smoking-related causes (116, 117). The Surgeon General stated, "The current rate of progress in tobacco control is not fast enough. More needs to be done" (117, p. 875). The US Food and Drug Administration (FDA) Commissioner endorsed the need for striking an appropriate balance between regulation and encouragement of the development of innovative nicotine or noncombustible tobacco products that are less dangerous than cigarettes (119). It is past time to add new and even radical approaches (13, 132).

The term alternative nicotine delivery systems (ANDS) encompasses a diverse class of noncombustible smokeless tobacco products or nicotine-containing products, primarily exemplified by e-cigarettes that are vaped not smoked (**Figure 1**). ANDS raise fundamental questions for society: Could ANDS be leveraged to effectively compete with cigarettes, eventually making smoking obsolete sooner than would otherwise be possible (2, 29, 57)? Can many types of ANDS, when decoupled from deadly toxins in combusted tobacco smoke, be accepted by the public and by its health, regulatory, and advocacy bodies as an extraordinary opportunity to save lives rather than as a threat to the success of past tobacco control efforts? These questions are contentious, and their answers are complicated. Addressing opportunities for ANDS requires reexamination of the role that nicotine plays in sustaining smoking and the role that nicotine can play in reducing smoking when delivered in a safer, yet appealing manner (36, 77, 85). In a major shift in FDA policy following the FDA Commissioner's announcement (119), a new national comprehensive nicotine management strategy was proposed (44): "The agency's new tobacco strategy has two primary parts: reducing the addictiveness of combustible cigarettes while recognizing and clarifying the role that potentially less harmful tobacco products could play in improving public health. . . .Reducing cigarettes' addictiveness could help users quit more easily and help keep those who are experimenting—young people, in particular—from becoming regular smokers. . . .The availability of potentially less harmful tobacco products could reduce risk while delivering satisfying levels of nicotine for adults who still need or want it" (p. 1).

Reexamination of nicotine's role in society requires reconsidering the harm minimization perspective within tobacco control (13, 46) (see the sidebar titled Harm Reduction or Harm Minimization). The primary goal of harm minimization is to prevent the use of nicotine-containing products among nonusers, while pragmatically acknowledging that less harmful noncombusted nicotine products either with tobacco (e.g., snus) or without tobacco (e.g., e-cigarettes) can dramatically reduce risk compared with smoking combusted products (1, 2, 13, 46, 57). Harm minimization is wholly consistent with tobacco control goals to prevent any use by underage youth (1) and encourage complete smoking cessation in both youth and adults and is responsive to the Surgeon General's admonition that more must be done to eliminate smoking tobacco (117).

We suggest a science-based reframing of nicotine use to inform current and future US and global tobacco control strategies. We use e-cigarettes as exemplars of ANDS, but newer types of ANDS products (e.g., that heat and do not burn tobacco) (102, 113) and accumulating scientific evidence will require continued discussions about managing nicotine's changing role in society. At times, our use of the term ANDS may also encompass classes of substantially less harmful

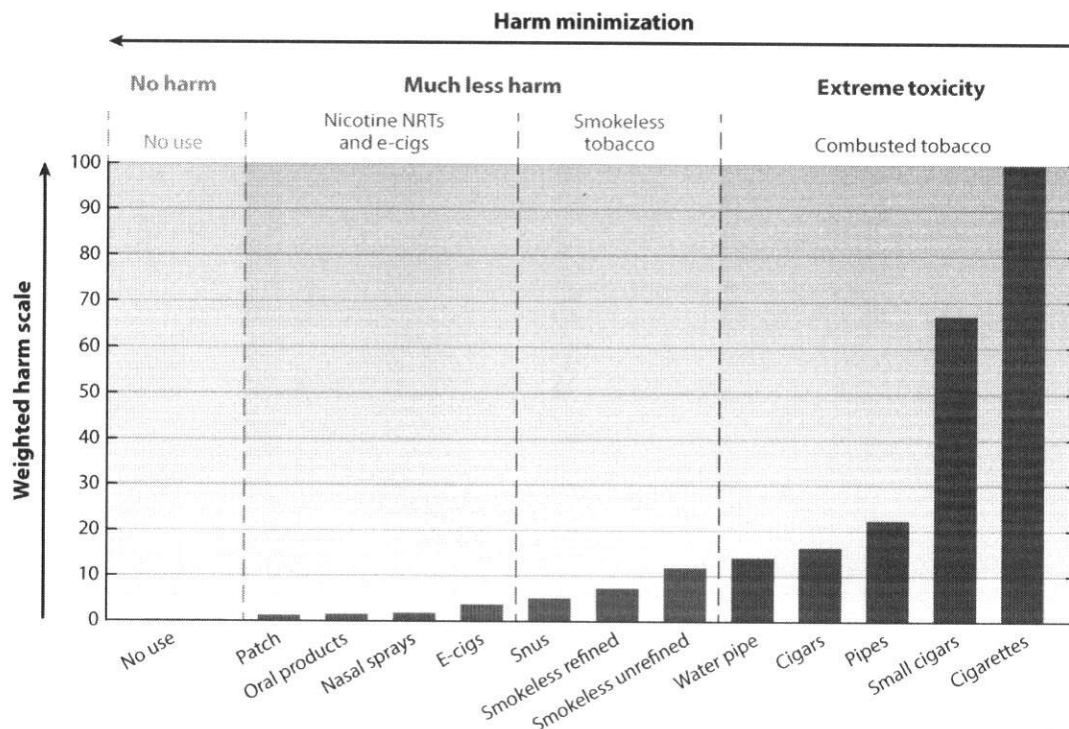


Figure 1

Products along the harm minimization continuum. Adapted with permission from Nutt et al. 2014 (89). The harm minimization continuum posits that all nicotine-containing products are not equally harmful and, instead, range from exceptionally low harm (e.g., NRT) to exceptionally high harm (e.g., combusted tobacco such as cigarettes, cigars, hookah, pipe). The figure depicts four panels representing classes of products. Products containing tobacco are depicted as combusted or smoked (panel 1, *right*) and noncombusted or smokeless (panel 2, *right middle*). Smokeless products are far less harmful than smoked tobacco, but there is variation in the smokeless tobacco category; low nitrosamine Swedish-type snus is lower in relative harm than unrefined tobacco. Heat-not-burn tobacco products (e.g., heat sticks) would fall into this panel. Panel 3 (*left middle*) depicts the class of nicotine delivery products without any tobacco (e-cigs/e-vapor products and NRTs). Panel 4 (*left*) depicts no use and thus no exposure. Abbreviations: e-cigs/e-vapor, electronic cigarettes; NRTs, nicotine replacement therapies.

noncombustible modes of nicotine delivery [i.e., medicinal nicotine replacement therapy (NRT), low nitrosamine Swedish snus, any smokeless tobacco, e-cigarettes] (30, 36, 38, 58, 60, 65).

The changing landscape of innovative reduced-harm products calls for a refocusing of tobacco control strategies, concentrating specifically on smoking control (57). Some traditional strategies will continue to be effective, whereas others may become ineffective or possibly iatrogenic (57) if

NRT: nicotine replacement therapy

HARM REDUCTION OR HARM MINIMIZATION

The term harm reduction implies any reduction in relative harm from a prior level, even a small reduction such as reducing smoking by one or two cigarettes per day. Harm minimization strives to reduce harms to zero (i.e., ideally to no use and thus no harmful exposure). When a consumer does not want to stop all nicotine use, then harm minimization implies striving for the complete elimination of smoked tobacco exposure by substituting it with the use of less harmful noncombusted forms of nicotine instead of smoking.

TCA (or FSPTCA):
The Family Smoking
Prevention and
Tobacco Control Act

CDER: FDA Center
for Drug Evaluation
Research

CTP: FDA Center for
Tobacco Products

Vaping: the inhalation
of e-cigarette aerosol

they slow rather than speed the demise of smoking (2, 77). Herein, we integrate science and policy analysis to address the critical questions that underpin public health practice, policy, regulation, advocacy, and communication on nicotine-containing products (128).

2. REFRAMING TOBACCO CONTROL AND NICOTINE USE

Decades of tobacco control interventions (e.g., age purchasing restrictions, taxation, media campaigns, cessation services) have significantly decreased smoking prevalence in the United States (20, 35, 54). The 2009 Tobacco Control Act (TCA) (120) and the newly promulgated nicotine management strategy (44) complement tobacco control efforts by giving the FDA statutory authority to regulate tobacco and ANDS products. The TCA includes a public health standard that requires regulators to consider the net impact of tobacco products on the population as a whole, including smokers and nonsmokers (1, 2, 41, 117, 128). Adding to the FDA's prior role [via the Center for Drug Evaluation Research (CDER)] of approving medicinal products (e.g., NRT) for smoking cessation, the FDA established the Center for Tobacco Products (CTP) to regulate the manufacture, distribution, and marketing of tobacco and emerging nicotine products for consumer use (i.e., recreational rather than medicinal) (2, 13, 57, 130).

Whereas the CTP's authorities seek to protect the public from products that could harm public health, the CTP can also promote public health by supporting products (e.g., using product standards) and encouraging behaviors that maximize net population benefits by displacing smoking (2, 44, 119, 120, 128). Public education by the CTP can change behavior by informing smokers about the harms of different classes of refined nicotine products (**Figure 1**), compared with both smoking (relative risk) and no use (absolute risk) (2, 13, 57, 103).

Both the emergence of ANDS products and the TCA provide an opportunity to enrich tobacco control with a harm minimization framework (2, 13, 44, 57, 119). The following sections use e-cigarettes as the main case example of the individual health and the population health potential of selected harm minimization strategies.

2.1. Decoupling Nicotine from Inhaled Smoke for Harm Minimization

The logic of smoking harm minimization is simple and compelling. As Michael Russell, a pioneer in the field, put it, "People smoke for nicotine but they die from the tar" (105, p. 1431). In getting the nicotine they seek, smokers are exposed to enormous harm, including from cardiovascular disease, cancer, and pulmonary diseases, due to the inhalation of toxic smoke from tobacco combustion products (117). For most smokers, there is little evidence that nicotine itself causes any of these classes of disease when decoupled from smoke [see details in Niaura et al. (85)]. Although nicotine use poses some risk for vulnerable groups (e.g., with cardiovascular disease or during pregnancy), this risk is substantially lower than the risk posed by continuing to smoke cigarettes (10, 29, 30, 85). Nicotine itself does not appear to cause cancer, even in former smokers who use low nitrosamine snus for decades (10, 30, 58, 60, 64–66, 85). Evidence also indicates that nicotine itself is relatively safe when obtained from FDA-approved NRT (85), which is widely used for smoking cessation (36, 38). E-cigarettes deliver nicotine without any tobacco in aerosol form (known as vapor) (30, 57, 103). Smokers switching to vaping have experienced improved lung capacity and less frequent asthma events (96–98). At the doses that smokers experience, nicotine itself carries minimal harm (38, 85). Thus, if smokers could be shifted from smoking to consuming clean nicotine (i.e., without smoke), many lives would be saved (24, 30). The safest course is to stop smoking or, better, never to start. But a harm minimization approach recognizes that demanding absolute perfection is often counterproductive and that, when a harmful behavior cannot be eliminated, it is necessary

to reduce its adverse health consequences (46). For those who are smoking and are unwilling or unable to quit nicotine use, moving to cleaner ANDS, including e-cigarettes, NRTs, or low nitrosamine snus, would reduce harm relative to smoking.

2.2. ANDS and the Harm Continuum: How Harmful Are E-Cigarettes?

The harm minimization continuum (**Figure 1**) posits that all nicotine-containing products are not equally harmful and, instead, range from exceptionally low harm (e.g., NRT) to exceptionally high harm (e.g., cigarettes, cigars, hookah) (41–43, 48, 61, 85, 90, 103). Smokeless tobacco is much lower on the risk continuum than combusted products but varies in risk within that class of products (e.g., low nitrosamine Swedish-type snus versus other smokeless tobacco with high nitrosamine levels) (30).

When nicotine is decoupled from the deadly toxins in inhaled smoke, it is substantially less harmful (10, 85, 103, 117). Most of the harm is due to the inhalation of combustion products [about 70 human carcinogens and other toxins in particulate matter (sometimes called “tars”) and carbon monoxide] (121). E-cigarette aerosol is very different. E-cigarettes do not contain any tobacco and do not produce carbon monoxide (103). The harm continuum (**Figure 1**) emphasizes a key point: It is not that e-cigarettes are completely safe, or even the safest nicotine-containing product available, but that they are much safer than smoking. NRTs are safe enough that CDER approved them for over-the-counter consumer use more than two decades ago. Long-term use of NRT has been endorsed as an acceptable strategy to reduce morbidity and mortality from smoking (23, 36, 122). CDER updated NRT labeling in 2013 to permit NRT use while smoking (also known as dual use) as part of the journey to cessation and permits sustained use for relapse prevention for a lifetime if need be (38).

Most reviews of toxicological, clinical, and epidemiological evidence indicate that the chemicals found in e-cigarettes, when used as intended, are far fewer and well below levels seen in cigarette smoke (10, 41, 42, 48, 85). According to the Royal College of Physicians in the United Kingdom, “[T]he available data suggest that they are unlikely to exceed 5% of those associated with combusted tobacco products” (103, p. 87). Studies in humans have also documented improved physiological outcomes, including reduced blood pressure, improved lung function, and lower disease symptoms, among smokers who switched to e-cigarettes (96, 97, 98). E-cigarettes are much less dependence-producing than are cigarettes (73, 109). Thus, the potential harm of e-cigarettes falls in the low range on the continuum. Harm levels do differ among e-cigarettes. Lab studies have documented some potentially toxic constituents in some devices, e-liquids, and flavors, especially when overheated to produce aldehydes (such as acrolein and formaldehyde) and an acrid “dry puff condition” unlikely to be tolerated by actual users (34). Nonetheless, prudent product standards can readily eliminate these unnecessary risks and ensure quality control over devices and liquids (2, 7, 30, 44, 119). In summary, the FDA’s Gottlieb & Zeller state: “Nicotine, though not benign, is not directly responsible for the tobacco-caused cancer, lung disease and heart disease that kill hundreds of thousands of Americans each year” (44, p. 1).

Dry puff: conditions when vaping with a high wattage, too much airflow, old coils, or no liquid; not normally used

2.3. Rethinking Nicotine: A Three-Dimensional Framework for Harm Minimization

Nicotine and tobacco products can fit into a three-dimensional conceptual space (**Figure 2**): (a) harmfulness, (b) appeal, and (c) satisfaction including dependence. **Figure 2** provides a road map with which to envision how to optimize ANDS product use to successfully compete with and

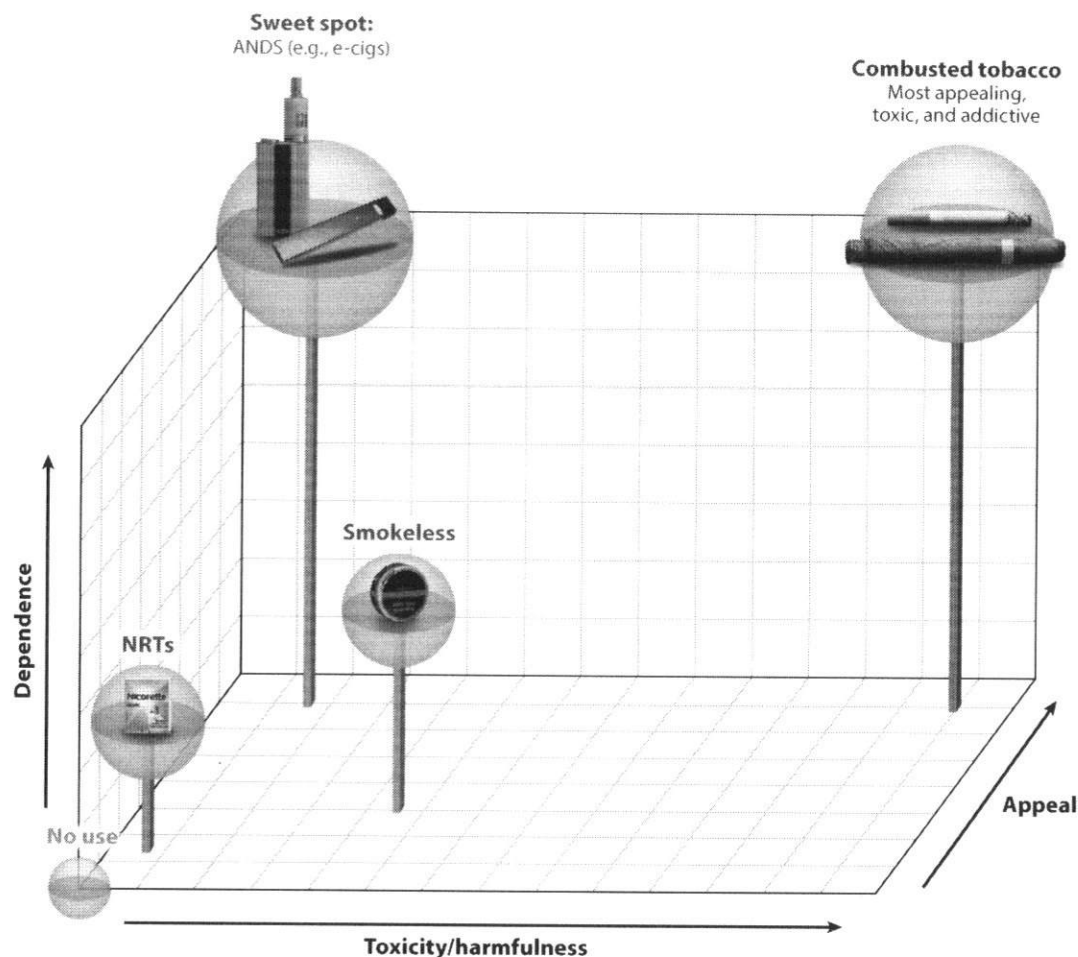


Figure 2

Multidimensional framework for nicotine-containing products. Nicotine and tobacco products can be depicted within a three-dimensional conceptual space: harmfulness (x -axis), appeal or popularity (z -axis), and satisfaction, which includes degree of dependence (y -axis). Appeal is a complex function of attractiveness, as well as cost, accessibility, and marketing practices, and appeal is related to satisfaction, including factors such as nicotine levels, taste, flavors, sensory characteristics, and dependence liability. This figure provides a roadmap with which to envision where a specific class of products can be placed. The top, back, right corner depicts the most popular (appealing), highly satisfying (dependence), and toxic space, whereas no use at all is zero on all three axes. Combusted products are, by far, the most appealing, satisfying, and toxic. The bottom, front, left space depicts products that have low toxicity but little appeal or satisfaction. NRTs are not used by many and are thus not appealing or satisfying and unlikely to displace cigarettes at a population level. Minimizing risk while making a net population health impact requires products to successfully compete with and replace smoking. Thus, the sweet spot, where ANDS products fall, is depicted by high appeal and satisfaction but low toxicity along with intermediate products such as Swedish-type snus, which has successfully displaced cigarettes in Sweden. Abbreviations: ANDS, alternative nicotine delivery systems; e-cigs/e-vapor, electronic cigarettes; NRTs, nicotine replacement therapies.

replace smoking, minimizing risk and making both an individual and a net population beneficial health impact.

As already depicted in **Figure 1** and described in Section 2.1, the toxicity of ANDS (e-cigarettes, smokeless nicotine, and NRTs) differs substantially from that of smoking (**Figure 2**, x -axis). The appeal or popularity of various types of ANDS also differs as does their degree of satisfaction

and thus their ability to displace smoking (**Figure 2**, *z*-axis), which contributes to the likelihood that ANDS will be adopted and its use sustained at a scale large enough to affect population-level outcomes (24). Appeal is a complex function of attractiveness, sensory characteristics, and subjective satisfaction (including nicotine level, taste, and flavors) as well as consumer beliefs about relative harm, cost, accessibility, and marketing practices (2, 30, 32, 33, 57, 106). A product with minimal satisfaction will not be appealing and is unlikely to be adopted or used extensively, which has proven to be the case with over-the-counter NRT (45, 134). Ideally, less harmful products must be sufficiently appealing. The ANDS product must also be believed to be much less harmful than smoking to encourage switching from the high- to the low-harm products.

Dependence (**Figure 2**, *y*-axis) refers to the potential for the product to provide satisfaction and, relatedly, its potential to induce addiction, which is a function of both its pharmacological and its subjective rewarding and sensory properties. Dependence can also reflect a response to negative consequences of stopping smoking (withdrawal) and to wanting the positive and desirable effects that nicotine can have for some users (e.g., the satisfaction related to improved alertness, attention, concentration, memory, or mood) (49, 86, 110). Some degree of satisfaction, benefit from, and even dependence on much less harmful ANDS may have to be acceptable to society (i.e., recreational use of clean nicotine similar to the societal acceptance of adult alcohol use and marijuana use, rather than prohibition of all forms of nicotine primarily because of its addiction liability) as a means of speeding the demise of smoking and its attendant massive harms (2, 57). The limited evidence available suggests relatively little harm in secondhand vapor, as compared with secondhand smoke (41). Society will need to develop separate policies for secondhand vapor as was done in the United Kingdom (103).

Cigarettes and combusted tobacco products are the most appealing, most addictive, and most toxic of all nicotine delivery products and thus have dominated use for more than a century (12, 100). They are the perfect storm, occupying the space at the highest level on all three dimensions (highest on all axes in **Figure 2**).

The question arises: Where do ANDS fit? The dimensional space depicted in **Figure 2** can be helpful in locating what may be the sweet spot of an ideal e-cigarette or a future innovation of an ANDS. This sweet spot is depicted by both ANDS and by the success of snus in displacing cigarettes in Sweden (64–66). Appealing flavors, efficient nicotine delivery, and lower cost compared with cigarettes all play an important role in improving the overall appeal of less harmful ANDS on a large-scale basis (32, 33). Smokers who have completely switched to e-cigarettes report that flavors other than tobacco helped them to sustain exclusive e-cigarette use (33, 104).

NRT products, while minimally harmful and dependence inducing, lack widespread appeal among smokers. NRT has demonstrated a weak ability to displace cigarettes, despite its evidence-based CDER approval as a cessation therapy and its strong support in tobacco control policy for more than 20 years (112). In contrast with NRT, some new innovations in e-cigarettes do begin to occupy the sweet spot in this three-dimensional space because some smokers have found an e-cigarette with sufficient appeal for them to sustain use and quit smoking (11, 15, 32, 33, 41, 51, 75). As evidence of their appeal, e-cigarettes are used by smokers more often than NRT in quit attempts in both the United States and the United Kingdom (19, 103).

The three-dimensional space provides a road map to help inform a harm minimization framework and to guide research, policy, and practice. Different products can be ordered in this space and be compared with one another. Classes of nicotine-containing products (e.g., combustible versus noncombustible; high versus low nitrosamine; fast versus slow nicotine delivery; flavored versus nonflavored) can be evaluated for comparative safety, appeal, and impact on smoking prevalence. One challenge is to identify products that move the largest proportion of nicotine users to a place along these three dimensions that minimizes net harm and maximizes net benefits.

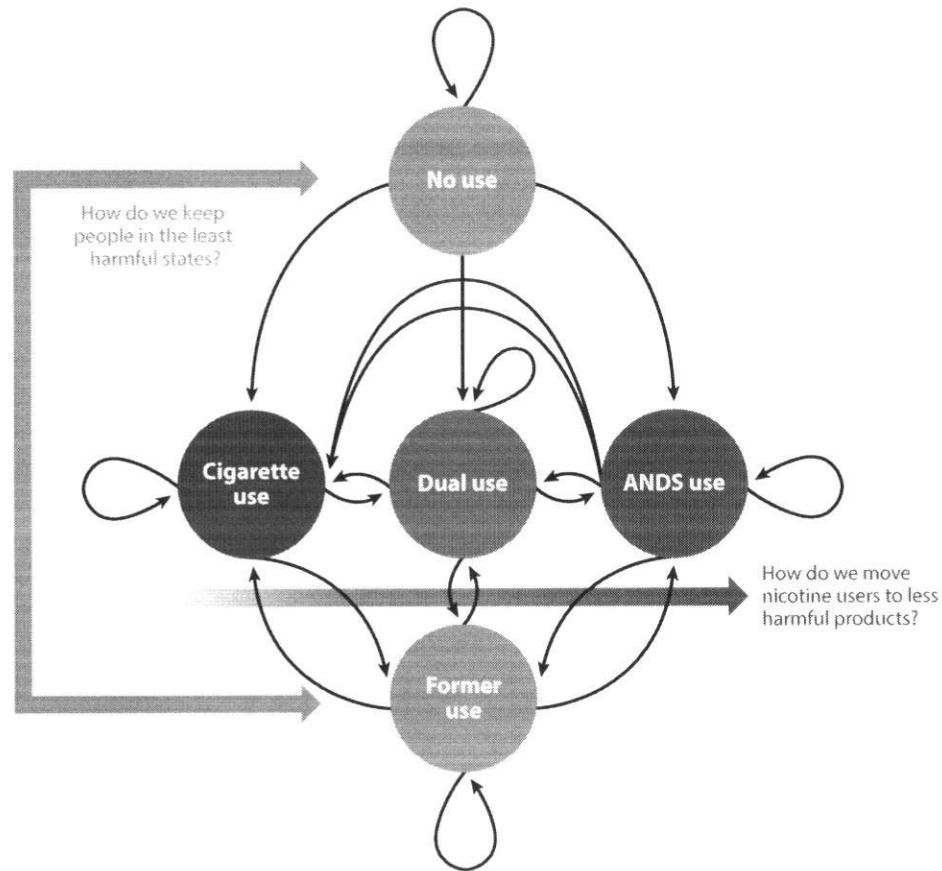


Figure 3

Markov state transition model of cigarette and e-cigarette use. This figure presents a state transition model using the example of cigarettes and ANDS to illustrate the possible states and pathways that must be considered to optimize a harm minimization strategy in tobacco control. Directed arrows represent transitions, whereas looped arrows at each state represent maintenance of that state. Youth prevention and smoking cessation strategies reinforce the states of noncurrent and former use depicted by green circles, and harm minimization strategies facilitate movement away from smoking to less harmful alternatives (*blue arrow*). Adapted with permission from Cobb et al. 2015 (23). Abbreviation: ANDS, alternative nicotine delivery systems.

Tobacco control strategy should be aligned so that less harmful ANDS are able to compete with, and ultimately completely replace, smoking for adults who want to use nicotine.

2.4. Systems Integration: Optimizing Population Benefits Over Harms

Population net exposure to harmful toxicants depends on the actual patterns and prevalence of product use, which vary along the continuum of harm (**Figures 1 and 2**). **Figure 3** presents a state transition model using the example of cigarettes and ANDS to illustrate the possible states and pathways that must be considered to optimize the benefits of a harm minimization strategy for smoking control (23, 57).

Individuals begin in the noncurrent use state (a variant of never use) and can either remain in that state or transition to current exclusive use of cigarettes or ANDS or to dual use. Once in a current use state, individuals can maintain use, transition to one of two alternative states, or cease use of both products. Former users may also maintain no use or relapse to current exclusive or dual

use. The CTP's public health standard implies an integrated consideration of product harms and benefits at the individual and population levels (including likelihoods of initiation and cessation). Population health could be improved by changes in nicotine-containing product use that result in transitions to less harmful use states (23). These changes include limiting movement from noncurrent use (i.e., preventing initiation of any nicotine product use by nonusers) and increasing movement away from cigarette use (perhaps via dual use) to exclusive use of less harmful ANDS and/or increased transition to former use and reduced relapse to smoking.

Each tobacco control strategy (e.g., taxes, media campaigns, treatment availability, accurate consumer knowledge of relative harms, regulations) will influence the flows from one state to another. Prevention of youth initiation and support for cessation will keep noncurrent and former users from starting or relapsing (depicted by green arrows and circles in **Figure 3**). Harm minimization strategies facilitate movement away from smoking (depicted by the blue arrow in **Figure 3**) by regulating and managing products according to their relative harms. Outcomes are determined empirically by estimating the prevalence rates within states and the transition rates between states based on population surveillance. Simulation modeling of the effects of policies and regulations on transition rates can indicate where harms might exceed benefits, given different scenarios of product use (70).

Three examples of these approaches could be (*a*) imposing a differential tax on nicotine-containing products that is proportional to their degree of harm, with less harmful products being minimally taxed and all combusted products being very highly taxed (22); (*b*) reducing the addiction liability of combusted tobacco via nicotine reduction while ensuring adequate and satisfying nicotine delivery in ANDS (9, 27); and (*c*) reducing the appeal of smoking by banning menthol and other flavors in smoked products (32, 33, 111, 124) but not in ANDS. Making combusted tobacco more expensive and less appealing while making ANDS more appealing, less harmful, and less costly are consistent with fully embracing harm minimization to speed users away from smoking as the primary end goal.

3. TWO MAJOR CHALLENGES TO ANDS AS A HARM MINIMIZATION STRATEGY

The concerns about a harm minimization strategy that relies on ANDS derive from two concerns about unintended harmful consequences and the fact that abstinence from all tobacco and nicotine products is safest. The concerns are that the availability of e-cigarettes or any other ANDS might lure some youth who would otherwise not smoke into smoking and that smokers who adopt e-cigarettes/ANDS, and who otherwise would have quit smoking altogether, might be led to continue smoking.

3.1. Do E-Cigarettes Attract Youth and Lead Them to Smoking and Lifelong Addiction?

Consistent with harm minimization, tobacco control should strive to prevent all youth initiation of nicotine, (e.g., prohibiting the sale of nicotine-containing products to those under legal purchase age, preventing predatory marketing to youth). This aspiration must be understood in the context of adolescent behavior. Risk-taking in adolescence is normative and results from competition between the strong socioemotional network in the brain and the immature cognitive-control network (108). Early risk-taking with any tobacco or nicotine product, such as an e-cigarette, may result from social or emotional rewards from trying a product, including peer approval or mood

Precautionary
principle: resisting a
new product with little
known effects

enhancement. Thus, eliminating all experimentation may not be a realistic goal, just as it has not been for cigarettes.

Existing studies show that current e-cigarette use by youth consists largely of experimentation, not long-term adoption (25, 127). As many as 70% of youth using e-cigarettes report only using flavors without nicotine (80). Poly-product use is common (25, 127). Findings are consistent with adolescent risk-taking (108) and shared vulnerabilities (25, 86, 123, 127). In the United States, whereas rates of past 30-day e-cigarette use in youth have risen between 2011 and 2014, these leveled off or dropped in 2015–2016 (25, 55, 81, 127, 133); contemporaneously, the prevalence of past 30-day cigarette smoking declined rapidly in youth to the lowest levels in history (41, 131). These patterns are consistent with data from the United Kingdom (8).

Longitudinal studies of youth never-cigarette users show that some ever-e-cigarette users try cigarettes during a follow-up period (6, 53, 67, 68, 79, 99, 107, 140–142), which raises some concern about so-called gateway effects (i.e., e-cigarette use leading directly to smoking) (63). But few studies examine the opposite transition: from cigarette use to e-cigarette use, a move toward less harm (blue arrow in **Figure 3**). Recent data show that 87% of past 30-day e-cigarette users have previously used a tobacco product, and 63% used a tobacco product in the past 30 days (127). Kozlowski & Warner (63) concluded that although society must be vigilant in tracking youth use trends, fears of harms (118) due to gateway effects seem to be exaggerated and are unlikely to undermine the much larger potential benefits of discouraging smoking behavior in the whole population.

Jurisdictions have adopted bans on e-cigarette sales to youth. Studies comparing the rates of youth cigarette use in US states with and without bans on sales to minors found that the prevalence of smoking was higher when youth access to e-cigarettes was restricted (37, 94, 95). These data illustrate the potential for some well-intentioned precautionary policies to have harmful effects.

Simulation modeling with sensitivity analyses that examine all the state and transition pathways in the state transition model (**Figure 3**) shows that the gateway effect would have to be implausibly large to increase the net public health harm (23, 70). Overall, the strongest science to date does not support the concerns that e-cigarettes are such a dire threat as to undermine 50 years of tobacco control success, to renormalize smoking, and to set off the addiction cycle for another generation of youth.

3.2. Do E-Cigarettes Help Smokers Quit or Do They Inhibit Cessation?

The public health benefits of e-cigarettes are enhanced if they promote complete cessation of smoking. Four randomized controlled trials (RCTs) and well-designed observational studies show that e-cigarettes are effective in helping some adult smokers successfully quit smoking (4, 16, 18, 31, 39, 41, 72, 78, 91, 93, 114, 126, 144). Rates of cessation using e-cigarettes are similar to or higher than rates of cessation from previous clinical trials of NRT (103, 112, 126). Although some studies with loosely defined measures of use (e.g., ever use, not necessarily for cessation), inadequate or no appropriate comparison groups, or inability to rule out plausible confounders or selection bias have reported that e-cigarette use may be associated with no change or negative correlations with cessation (41, 126), those studies with more robust measures of how e-cigarettes were used (e.g., duration of use, type of device, use specifically for cessation) suggest that daily vaping can facilitate quit attempts and cessation (11, 15, 51, 75, 126). Weak observational studies that did not meet the minimum criteria for scientific rigor [see details in Villanti et al. (126)] were also excluded from two reviews (47, 78) that employed the Cochrane criteria for inclusion in systematic reviews and meta-analyses (50). One other meta-analysis did not employ Cochrane standards, included most of the weak studies (56), and reported a negative association among

e-cigarette use and smoking cessation, concluding that e-cigarettes inhibit cessation. The Cochrane Handbook warns: “Meta-analysis of studies that are at risk of bias may be seriously misleading. If bias is present in each (or some) of the individual studies, meta-analysis will simply compound the errors, and produce a ‘wrong’ result that may be interpreted as having more credibility” (50, p. 247). New innovations in e-cigarette models (e.g., tank, mod and pod systems) provide more effective nicotine delivery, so studies on earlier devices may not be as strong as recent evaluations of e-cigarettes’ positive public health effect (92, 126). Four recently published studies using large national US data sets add to the science that e-cigarettes are associated with smoking cessation (39, 72, 93, 144).

Smokers’ complete displacement of cigarettes can take time. For many, a period of dual use is expected and can be acceptable along the path to smoking cessation. A transitional period of dual use with e-cigarettes and cigarettes is consistent with CDER-approved dual use of NRT (38). We are not aware of any evidence indicating that vaping has contributed to reduced interest in quitting smoking, has slowed the rate of cessation, or has promoted relapse in large numbers of long-term former smokers who had been quit for 5 years or longer (41). Surveys of e-cigarette users consistently indicate that, for most smokers, quitting cigarettes is one major reason for ANDS use (41), even among youth (125). In the years when e-cigarette use increased the most, studies revealed a rise in quit attempts (5, 40), along with either a steady or faster drop in cigarette use among both youth and adults rather than a slowing of prevalence reduction (21, 82). Studies suggest that daily users of e-cigarettes for a month or more are six times more likely to have quit smoking cigarettes two years later (11); former smokers who quit less than one year prior are four times more likely to be daily e-cigarette users compared with current smokers (26); and studies from the United Kingdom suggest that e-cigarettes have increased quitting rates and therefore reduced smoking prevalence above what would have otherwise been expected (135). In 2014, more than six million smokers in the European Union quit smoking with e-cigarettes (31).

Available scientific evidence does not support the contention that e-cigarettes when used daily specifically to quit smoking either inhibit cessation or are undermining historical tobacco control cessation efforts (31, 41, 63, 70, 77, 103, 126). Much less harmful ANDS products such as e-cigarettes could help displace cigarettes on a larger scale than NRT has because of differential appeal such as the use of flavors while eliminating flavors from smoked products, lower cost due to differential taxation, and differential ease of access relative to smoked tobacco (22–24).

4. POLICY IMPLICATIONS

The harm minimization approach yields clear implications for tobacco control policies, which demands a reorientation of these policies starting with a return to their harm minimization roots (see the sidebar titled *Saving Smokers’ Lives Now While Simultaneously Protecting Youth*). A core harm minimization principle is that policy, regulation, and advocacy be science based and proportional to the degree of product harm, with the most restrictive strategies applying to the most harmful products (2, 7, 13, 57, 77, 103).

4.1. Reaffirming Harm Minimization in Tobacco Control

Harm minimization was an accepted strategy at the beginning of tobacco control efforts in the 1960s (57). It was and still is implicit in tobacco control support for CDER-approved over-the-counter use of NRT as a safe nicotine product (38). Public health advocates are now often skeptical of reduced harm products because of mistrust of the tobacco industry and commercial entities more generally, given the experience of the highly misleading promotion of low-tar “light” cigarettes

SAVING SMOKERS' LIVES NOW WHILE SIMULTANEOUSLY PROTECTING YOUTH

The key challenge is to implement policies that maximize the net flow away from smoking and toward the use of safer products or to no use. A balance can and must be found to protect youth without discouraging cleaner nicotine use by smokers unable or not wishing to stop their nicotine use (1, 2, 7, 13, 77, 103). Considerations include (a) devising a regulatory and policy framework that focuses on reducing smoking; (b) enabling the public to have accurate information about and incentives to adopt less harmful options of nicotine delivery; and (c) allowing product innovation and market forces, as well as regulation proportionate to product harms, to contribute to the speedy demise of smoking. Delays in harm minimization may impede the end of smoking rather than encourage smokers to switch to safer nicotine delivery products. Emergence and uptake of low-risk tobacco and nicotine products, including ANDS such as e-cigarettes, as alternatives to smoking create the possibility of deep and rapid public health gains through the substitution of high-risk products by low-risk products.

(57, 59) that were not, in fact, reduced-harm products (84). This skepticism has generalized, negating all harm minimization strategies and data, including the well-documented successful Swedish experience with snus. Smokeless tobacco is still viewed by the World Health Organization and most countries as “not a safe alternative to smoking” even if it is much less harmful (57, 58, 60, 76), and e-cigarettes are also being banned in many countries (13).

Harm minimization approaches have often been resisted in many areas of risky behavior because of fears of unintended harmful consequences. But when carefully implemented, these approaches have dramatically reduced harm at the individual and population levels [e.g., condom use (115) and needle-exchange programs for HIV prevention (17, 85, 116, 129, 138)].

4.2. Industry Considerations

In tobacco control, there is understandable trepidation in supporting alternatives that may risk undermining 50 years of tobacco control efforts, given past tobacco industry behavior [for details, see Royal College of Physicians (103, pp. 135–45)]. While holding the traditional tobacco industry and the newer ANDS industries strictly accountable, if, out of an abundance of caution, tobacco control strategies fail to fully embrace movement to less harmful products (or actively discourage such movement), the result could be detrimental for smokers who are unable to quit or who do not wish to quit nicotine use completely (143). A key question is whether the combination of technological advances (i.e., ANDS) and regulation can align makers of safer nicotine-containing products with public health advocates to eliminate combusted tobacco as a defective and unacceptable product for human use (12, 31, 77, 87, 88, 100, 101, 143).

4.3. Public Education and Communication

Accurate public information is a crucial part of tobacco control policy (28). The positive impact of e-cigarettes may have been slowed by exaggerated claims of their harms (62, 63) and the harms of nicotine in general (28). Only 5.3% of Americans correctly believe that e-cigarettes are “much less harmful” than cigarettes, 37% believe they are the same or worse than smoking, and 34% don’t know (74, 83). Misperceptions of the harms of nicotine and e-cigarettes have recently increased, undermining their full potential to displace smoking (14, 52, 62, 74). A misinformed public lacks the information required to take health-protective action (28, 60, 62). Accurate public education is needed to counteract misperceptions of harm from nicotine and ANDS, to communicate the

continuum of risk related to the use of different tobacco and ANDS products (**Figure 1**), and to emphasize the importance of smoking cessation. ANDS should always be compared with smoked tobacco products (relative harms), and the mistaken public beliefs that nicotine is the cause of disease risk and cancer, rather than the smoke from combustion, must be dispelled (44). Fears that nicotine causes cancer discourages use of FDA-approved NRTs as well as e-cigarettes and other ANDS as viable ways to stop smoking cigarettes (28).

5. CONCLUSIONS

Harm minimization is a pragmatic approach that can complement proven current tobacco control efforts of prevention and cessation (1, 2, 7, 13, 41, 57, 63, 77, 85, 103). Its primary goal is to move the whole population of smokers of toxic combusted tobacco products to exclusive use of much safer products as quickly and as early as possible in their individual smoking careers. If prudently regulated (2, 103), e-cigarettes and Swedish snus (64–66) provide a great opportunity to disrupt the US and global smoking-related disease pandemic and offer a proof-of-principle for the potential role of further innovations in ANDS in improving public health (7, 13, 28, 70, 71, 143, 144). This opportunity depends on encouraging increased technological innovation and finding the appropriate balance between product safety, consumer appeal, and regulations targeted specifically to decrease the use of conventional, combusted tobacco products.

Regulation, policy, practice, and advocacy for harm minimization approaches have the potential to realign market forces and economic incentives for those willing to responsibly manufacture and market much less harmful ANDS products to adult consumers (2, 22, 24, 28, 66, 143). Even if the risk of harm to some youth who otherwise would not have smoked is marginally increased, such risks must be weighed against the substantial and immediate benefits of displacing smoking with safer nicotine products among both youth and adults (2, 13, 22, 24, 57, 63, 77, 103). Under all but the most implausible scenarios, population simulation modeling estimates millions of life years saved by employing the principles of harm minimization and switching smokers to safer ANDS products (70, 71, 126). Replacement of most cigarette use by e-cigarette use over a 10-year period yields up to 6.6 million fewer premature deaths with 86.7 million fewer life years lost (69). America and the world need a candid smoking control champion—a figure like C. Everett Koop, Surgeon General during the first eight years of the AIDS epidemic—to get out the latest accurate information about reduced harm ANDS products that could save millions of smokers' lives (28). Ethics and integrity in responsibly interpreting the scientific evidence with rigor (3, 7, 13, 28, 41, 57, 62, 63, 77, 78, 103, 127, 126), and with common sense, demand it.

SUMMARY POINTS

1. Inhaled tobacco smoke remains the single biggest threat to public health; it is widely used, highly appealing, addictive, and extremely toxic.
2. There is a continuum of harm of nicotine-containing products, from the high harm of combusted tobacco to much lower harms of noncombustible nicotine delivery with or without tobacco, including NRT.
3. In considering how to maximize population benefit and minimize population harm, one must fully consider all three dimensions of nicotine products and locate the sweet spot (see **Figures 2 and 3**), which defines the characteristics of products most likely to displace smoking: (a) lower harm, (b) sufficient appeal, and (c) sufficiently satisfying nicotine delivery.

4. Tobacco control strategies should adopt the concept of harm minimization in developing coordinated regulations, policies, and interventions to rapidly move smokers toward less harmful nicotine delivery products, while preventing the adoption of regular nicotine-containing or tobacco product use among youth.
5. The public must be accurately educated about the relative harms of nicotine-containing products relative to smoking.
6. A harm minimization approach implies proportionality of harm based on each product class. Policies and regulations must be aligned on the basis of proportionate harm.
7. Harm minimization is an evidence-based approach to tobacco control, which, when complemented by other, proven tobacco control interventions, can simultaneously prevent youth from starting to smoke and help current smokers stop, saving many lives more quickly than would otherwise be possible.

FUTURE ISSUES

1. Research is needed on the pathways by which ANDS can lead to the displacement of smoking. Traditional smoking cessation treatment designs may not be optimal because they focus on near-term outcomes of focused quit efforts, whereas the adoption of ANDS as an alternative to smoking may involve more of a gradual evolution in the smoker's goals and behaviors.
2. New and evolving ANDS products may raise new issues and data needs. For example, products that heat rather than burn tobacco, but still mimic smoking, may raise issues different from those raised by e-cigarettes.
3. Because not all effects of policies or products can be anticipated, frameworks for robust and responsive postmarket population surveillance and for modeling of likely outcomes of ANDS use need to be established.
4. A regulatory framework that aligns business goals with public health goals will need to be developed. Absent regulation, ANDS have evolved very quickly toward more effective nicotine delivery. Although regulation is necessary to ensure that product innovations are consistent with public health goals, it also has the potential to stifle innovation and thus undermine the potential of ANDS as a public health success.
5. A harm minimization strategy acknowledges that nicotine use and even dependence may be acceptable in the interest of reducing tobacco-caused death and disease. This approach will require a focused, objective, evidence-based dialogue that separates concerns about nicotine use and dependence from concerns about medical harm and implies a substantial shift in public, professional, and regulatory attitudes in the interest of eventually ending combusted tobacco use.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

All authors were supported by Truth Initiative. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health, the US Food and Drug Administration, or the Truth Initiative.

LITERATURE CITED

1. Abrams DB. 2014. Potential and pitfalls of e-cigarettes—reply. *JAMA* 311:1922–23
2. Abrams DB. 2014. Promise and peril of e-cigarettes: Can disruptive technology make cigarettes obsolete? *JAMA* 311:135–36
3. Abrams DB, Niaura R. 2015. The importance of science-informed policy and what the data really tell us about e-cigarettes. *Isr. J. Health Policy Res* 4:22
4. Adriaens K, Van Gucht D, Declerck P, Baeyens F. 2014. Effectiveness of the electronic cigarette: an eight-week Flemish study with six-month follow-up on smoking reduction, craving and experienced benefits and complaints. *Int. J. Environ. Res. Public Health* 11:11220–48
5. Babb S, Malarcher A, Schauer G, Asman K, Jamal A. 2017. Quitting smoking among adults—United States, 2000–2015. *MMWR* 65:1457–64
6. Barrington-Trimis JL, Urman R, Berhane K, Unger JB, Cruz TB, et al. 2016. E-cigarettes and future cigarette use. *Pediatrics* 138:e20160379
7. Bates C. 2017. *Rethinking nicotine: implications for U.S. federal tobacco policy*. Discuss. Pap., Counterfactual, London. <https://www.clivebates.com/documents/FDAREformJune2017.pdf>
8. Bauld L, MacKintosh AM, Ford A, McNeill A. 2016. E-cigarette uptake amongst UK youth: experimentation, but little or no regular use in nonsmokers. *Nicotine Tob. Res.* 18:102–3
9. Benowitz NL, Donny EC, Hatsukami DK. 2017. Reduced nicotine content cigarettes, e-cigarettes and the cigarette end game. *Addiction* 112:6–7
10. Benowitz NL, Fraiman JB. 2017. Cardiovascular effects of electronic cigarettes. *Nat. Rev. Cardiol.* 14:447–56
11. Biener L, Hargraves JL. 2015. A longitudinal study of electronic cigarette use among a population-based sample of adult smokers: association with smoking cessation and motivation to quit. *Nicotine Tob. Res.* 17:127–33
12. Brandt AM. 2007. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*. New York: Basic Books
13. Britton J, Bogdanovica I, McNeill A, Bauld L. 2016. *Commentary on WHO Report on electronic nicotine delivery systems and electronic non-nicotine delivery systems*. UK Cent. Tob. Alcohol Stud., Nottingham, UK. <http://ukctas.net/pdfs/UKCTAS-response-to-WHO-ENDS-report-26.10.2016.pdf>
14. Brose LS, Brown J, Hitchman SC, McNeill A. 2015. Perceived relative harm of electronic cigarettes over time and impact on subsequent use. A survey with 1-year and 2-year follow-ups. *Drug Alcohol. Depend.* 157:106–11
15. Brose LS, Hitchman SC, Brown J, West R, McNeill A. 2015. Is the use of electronic cigarettes while smoking associated with smoking cessation attempts, cessation and reduced cigarette consumption? A survey with a 1-year follow-up. *Addiction* 110:1160–68
16. Bullen C, Howe C, Laugesen M, McRobbie H, Parag V, et al. 2013. Electronic cigarettes for smoking cessation: a randomised controlled trial. *Lancet* 382:1629–37
17. Can. Paediatr. Soc. 2008. Harm reduction: an approach to reducing risky health behaviours in adolescents. *Paediatr. Child Health* 13:53–56
18. Caponnetto P, Campagna D, Cibella F, Morjaria JB, Caruso M, et al. 2013. Efficiency and Safety of an eElectronic cigarette (ECLAT) as tobacco cigarettes substitute: a prospective 12-month randomized control design study. *PLOS ONE* 8:e66317
19. Caraballo RS, Shafer PR, Patel D, Davis KC, McAfee TA. 2017. Quit methods used by US adult cigarette smokers, 2014–2016. *Prev. Chronic Dis.* 14:E32

20. CDC (Cent. Dis. Control Prev.). 2014. *Best Practices for Comprehensive Tobacco Control Programs—2014*. Atlanta: US Dep. Health Hum. Serv., Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health
21. CDC (Cent. Dis. Control Prev.). 2016. *Early Release of Selected Estimates Based on Data from the National Health Interview Survey, January–March 2016*. Atlanta: US Dep. Health Hum. Serv., Cent. Dis. Control Prev., Natl. Cent. Health Stat.
22. Chaloupka FJ, Sweanor D, Warner KE. 2015. Differential taxes for differential risks—toward reduced harm from nicotine-yielding products. *N. Engl. J. Med.* 373:594–97
23. Cobb CO, Villanti AC, Graham AL, Pearson JL, Glasser AM, et al. 2015. Markov modeling to estimate the population impact of emerging tobacco products: a proof-of-concept study. *Tobacco Reg. Sci.* 1(2):121–41
24. Cobb NK, Abrams DB. 2014. The FDA, e-cigarettes, and the demise of combusted tobacco. *N. Engl. J. Med.* 371:1469–71
25. Collins LK, Villanti AC, Pearson JL, Glasser AM, Johnson AL, et al. 2017. Frequency of youth e-cigarette, tobacco, and poly-use in the United States, 2015: Update to Villanti et al., “Frequency of Youth E-Cigarette and Tobacco Use Patterns in the United States: Measurement Precision Is Critical to Inform Public Health.” *Nicotine Tob. Res.* 19:1253–54
26. Delnevo CD, Giovenco DP, Steinberg MB, Villanti AC, Pearson JL, et al. 2016. Patterns of electronic cigarette use among adults in the United States. *Nicotine Tob. Res.* 18:715–19
27. Donny EC, Denlinger RL, Tidey JW, Koopmeiners JS, Benowitz NL, et al. 2015. Randomized trial of reduced-nicotine standards for cigarettes. *N. Engl. J. Med.* 373:1340–49
28. Fairchild A, Niaura R, Abrams D. 2017. America needs a candid smoking control champion. *The Hill*, Nov. 13. <http://thehill.com/opinion/healthcare/360111-america-needs-a-candid-smoking-control-champion>
29. Fagerstrom K, Etter JF, Unger JB. 2015. E-cigarettes: a disruptive technology that revolutionizes our field? *Nicotine Tob. Res.* 17:125–26
30. Fagerstrom KO, Bridgman K. 2014. Tobacco harm reduction: the need for new products that can compete with cigarettes. *Addict. Behav.* 39:507–11
31. Farsalinos KE, Poulas K, Voudris V, Le Houezec J. 2016. Electronic cigarette use in the European Union: analysis of a representative sample of 27,460 Europeans from 28 countries *Addiction* 111(11):2032–40
32. Farsalinos KE, Poulas K, Voudris V, Le Houezec J. 2017. Prevalence and correlates of current daily use of electronic cigarettes in the European Union: analysis of the 2014 Eurobarometer survey. *Intern. Emerg. Med.* 12:757–63
33. Farsalinos KE, Romagna G, Tsiapras D, Kyrzopoulos S, Spyrou A, Voudris V. 2013. Impact of flavour variability on electronic cigarette use experience: an Internet survey. *Int. J. Environ. Res. Public Health* 10:7272–82
34. Farsalinos KE, Voudris V, Poulas K. 2015. E-cigarettes generate high levels of aldehydes only in ‘dry puff’ conditions. *Addiction* 110:1352–56
35. Feirman SP, Glasser AM, Rose S, Niaura R, Abrams DB, et al. 2017. Computational models used to assess US tobacco control policies. *Nicotine Tob. Res.* 19:1257–67
36. Fiore MC, Schroeder SA, Baker TB. 2014. Smoke, the chief killer—strategies for targeting combustible tobacco use. *N. Engl. J. Med.* 370:297–99
37. Friedman AS. 2015. How does electronic cigarette access affect adolescent smoking? *J. Health Econ.* 44:300–8
38. Fucito LM, Bars MP, Forray A, Rojewski AM, Shiffman S, et al. 2014. Addressing the evidence for FDA nicotine replacement therapy label changes: a policy statement of the Association for the Treatment of Tobacco Use and Dependence and the Society for Research on Nicotine and Tobacco. *Nicotine Tob. Res.* 16:909–14
39. Giovenco DP, Delnevo CD. 2018. Prevalence of smoking cessation by electronic cigarette use status in a national sample of recent smokers. *Addict Behav.* 76:129–34
40. Gitchell JG, Shiffman S, Sembower MA. 2017. Trends in serious quit attempts in the United States, 2009–14. *Addiction* 112:897–900

41. Glasser AM, Collins L, Pearson JL, Abudayyeh H, Niaura RS, et al. 2017. Overview of electronic nicotine delivery systems: a systematic review. *Am. J. Prev. Med.* 52:e33–66
42. Goniewicz ML, Gawron M, Smith DM, Peng M, Jacob P 3rd, Benowitz NL. 2017. Exposure to nicotine and selected toxicants in cigarette smokers who switched to electronic cigarettes: a longitudinal within-subjects observational study. *Nicotine Tob. Res.* 19:160–67
43. Goniewicz ML, Knysak J, Gawron M, Kosmider L, Sobczak A, et al. 2014. Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. *Tob. Control* 23:133–39
44. Gottlieb S, Zeller M. 2017. A nicotine-focused framework for public health. *N Engl. J. Med.* 377(12):1111–14
45. Hammond D, McDonald PW, Fong GT, Borland R. 2004. Do smokers know how to quit? Knowledge and perceived effectiveness of cessation assistance as predictors of cessation behaviour. *Addiction* 99:1042–48
46. Harm Reduct. Int. 2017. *What is harm reduction?* Harm Reduct. Int., London. <https://www.hri.global/what-is-harm-reduction>
47. Hartmann-Boyce J, McRobbie H, Bullen C, Begh R, Stead LF, Hajek P. 2016. Electronic cigarettes for smoking cessation. *Cochrane Database Syst. Rev.* (9):CD010216
48. Hecht SS, Carmella SG, Kotandeniya D, Pillsbury ME, Chen M, et al. 2015. Evaluation of toxicant and carcinogen metabolites in the urine of e-cigarette users versus cigarette smokers. *Nicotine Tob. Res.* 17:704–9
49. Heishman SJ, Kleykamp BA, Singleton EG. 2010. Meta-analysis of the acute effects of nicotine and smoking on human performance. *Psychopharmacology* 210:453–69
50. Higgins JPT, Green S. 2008. *Cochrane Handbook for Systematic Reviews of Interventions*, *Cochrane Book Series*. West Sussex, UK: Wiley-Blackwell
51. Hitchman SC, Brose LS, Brown J, Robson D, McNeill A. 2015. Associations between e-cigarette type, frequency of use, and quitting smoking: findings from a longitudinal online panel survey in Great Britain. *Nicotine Tob. Res.* 17:1187–94
52. Huerta TR, Walker DM, Mullen D, Johnson TJ, Ford EW. 2017. Trends in e-cigarette awareness and perceived harmfulness in the U.S. *Am. J. Prev. Med.* 52:339–46
53. Huh J, Leventhal AM. 2016. Progression of poly-tobacco product use patterns in adolescents. *Am. J. Prev. Med.* 51:513–17
54. IOM (Inst. Med.). 2007. *Ending the Tobacco Problem: A Blueprint for the Nation*. Washington, DC: Natl. Acad. Press
55. Jamal A, Gentzke A, Hu SS, Cullen KA, Apelberg BJ, et al. 2017. Tobacco use among middle and high school students—United States, 2011–2016. *MMWR* 66:597–603
56. Kalkhoran S, Glantz SA. 2016. E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis. *Lancet Respir. Med.* 4:116–28
57. Kozlowski LT, Abrams DB. 2016. Obsolete tobacco control themes can be hazardous to public health: the need for updating views on absolute product risks and harm reduction. *BMC Public Health* 16:432
58. Kozlowski LT, Edwards BQ. 2005. “Not safe” is not enough: Smokers have a right to know more than there is no safe tobacco product. *Tob. Control* 14(Suppl. 2):ii3–7
59. Kozlowski LT, Goldberg ME, Yost BA, White EL, Sweeney CT, Pillitteri JL. 1998. Smokers’ misperceptions of light and ultra-light cigarettes may keep them smoking. *Am. J. Prev. Med.* 15:9–16
60. Kozlowski LT, O’Connor RJ. 2003. Apply federal research rules on deception to misleading health information: an example on smokeless tobacco and cigarettes. *Public Health Rep.* 118:187–92
61. Kozlowski LT, Strasser AA, Giovino GA, Erickson PA, Terza JV. 2001. Applying the risk/use equilibrium: use medicinal nicotine now for harm reduction. *Tob. Control* 10:201–3
62. Kozlowski LT, Sweanor D. 2016. Withholding differential risk information on legal consumer nicotine/tobacco products: the public health ethics of health information quarantines. *Int. J. Drug Policy* 32:17–23
63. Kozlowski LT, Warner KE. 2017. Adolescents and e-cigarettes: Objects of concern may appear larger than they are. *Drug Alcohol. Depend.* 174:209–14
64. Lee PN. 2011. Summary of the epidemiological evidence relating snus to health. *Regul. Toxicol. Pharmacol.* 59:197–214

65. Lee PN. 2013. Epidemiological evidence relating snus to health—an updated review based on recent publications. *Harm. Reduct. J.* 10:36
66. Lee PN, Hamling J. 2009. Systematic review of the relation between smokeless tobacco and cancer in Europe and North America. *BMC Med.* 7:36
67. Leventhal AM, Stone MD, Andrabi N, Barrington-Trimis J, Strong DR, et al. 2016. Association of e-cigarette vaping and progression to heavier patterns of cigarette smoking. *JAMA* 316:1918–20
68. Leventhal AM, Strong DR, Kirkpatrick MG, Unger JB, Sussman S, et al. 2015. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *JAMA* 314:700–7
69. Levy DT, Borland R, Lindblom EN, Goniewicz ML, Meza R, et al. 2017. Potential deaths averted in USA by replacing cigarettes with e-cigarettes. *Tob Control* 27:18–25
70. Levy DT, Borland R, Villanti AC, Niaura R, Yuan Z, et al. 2017. The application of a decision-theoretic model to estimate the public health impact of vaporized nicotine product initiation in the United States. *Nicotine Tob. Res.* 19:149–59
71. Levy DT, Cummings KM, Villanti AC, Niaura R, Abrams DB, et al. 2017. A framework for evaluating the public health impact of e-cigarettes and other vaporized nicotine products. *Addiction* 112(1):8–17
72. Levy DT, Yuan Z, Luo Y, Abrams DB. 2017. The relationship of e-cigarette use to cigarette quit attempts and cessation: insights from a large, nationally representative U.S. survey. *Nicotine Tob. Res.* <https://doi.org/10.1093/ntr/ntx166>
73. Liu G, Wasserman E, Kong L, Foulds J. 2017. A comparison of nicotine dependence among exclusive E-cigarette and cigarette users in the PATH study. *Prev. Med.* 104:86–91
74. Majeed BA, Weaver SR, Gregory KR, Whitney CF, Slovic P, et al. 2017. Changing perceptions of harm of e-cigarettes among U.S. adults, 2012–2015. *Am. J. Prev. Med.* 52:331–38
75. Manzoli L, Flacco ME, Fiore M, La Vecchia C, Marzuillo C, et al. 2015. Electronic cigarettes efficacy and safety at 12 months: cohort study. *PLOS ONE* 10:e0129443
76. Marlatt GA, Witkiewitz K. 2010. Update on harm-reduction policy and intervention research. *Annu. Rev. Clin. Psychol.* 6:591–606
77. McNeill A, Brose LS, Calder R, Hitchman S, Hajek P, McRobbie H. 2015. *E-Cigarettes: An Evidence Update—A Report Commissioned by Public Health England*. London: Public Health England
78. McRobbie H, Bullen C, Hartmann-Boyce J, Hajek P. 2014. Electronic cigarettes for smoking cessation and reduction. *Cochrane Database Syst. Rev.* 12:CD010216
79. Miech R, Patrick ME, O'Malley PM, Johnston LD. 2017. E-cigarette use as a predictor of cigarette smoking: results from a 1-year follow-up of a national sample of 12th grade students. *Tob. Control* <https://doi.org/10.1136/tobaccocontrol-2016-053291>
80. Miech R, Patrick ME, O'Malley PM, Johnston LD. 2017. What are kids vaping? Results from a national survey of US adolescents. *Tob. Control* 26:386–91
81. Monit. Future—Univ. Mich. 2017. *Table 1: Trends in annual and 30-day prevalence of use of other tobacco products for grades 8, 10, and 12*. Univ. Mich., Ann Arbor. <http://www.monitoringthefuture.org/data/16data/16cigtbl1.pdf>
82. Monit. Future—Univ. Mich. 2017. *Table 2: Trends in prevalence of use of cigarettes in grades, 8, 10, and 12*. Univ. Mich., Ann Arbor. <http://www.monitoringthefuture.org/data/16data/16cigtbl2.pdf>
83. NCI (Natl. Cancer Inst.). 2015. *Compared to smoking cigarettes, would you say that electronic cigarettes are...* Health Inf. Natl. Trends Survey (HINTS) Response, NCI, Natl. Inst. Health, Bethesda, MD. https://hints.cancer.gov/question-details.aspx?PK_Cycle=8&qid=1282
84. NCI (Natl. Cancer Inst.). 2017. *Dispelling myths about nicotine replacement therapy*. Fact Sheet, NCI, Natl. Inst. Health, Bethesda, MD. <http://smokefree.gov/sites/default/files/pdf/mythsaboutNRTfactsheet.pdf>
85. Niaura R. 2016. *Re-thinking nicotine and its effects*. Schroeder Inst. Tob. Res. Policy Stud., Truth Initiat., Washington, DC. <https://truthinitiative.org/sites/default/files/ReThinking-Nicotine.pdf>
86. Niaura RS, Glynn TJ, Abrams DB. 2014. Youth experimentation with e-cigarettes: another interpretation of the data. *JAMA Pediatr.* 312:641–42
87. Nocera J. 2015. Can e-cigarettes save lives? *New York Times*, Oct. 16. https://www.nytimes.com/2015/10/17/opinion/can-e-cigarettes-save-lives.html?_r=0

88. Nocera J. 2017. When public health and Big Tobacco align. *Bloomberg View*, March 9. <https://www.bloomberg.com/view/articles/2017-03-09/when-public-health-and-big-tobacco-align>
89. Nutt DJ, Phillips LD, Balfour D, Curran HV, Dockrell M, et al. 2014. Estimating the harms of nicotine-containing products using the MCDA approach. *Eur. Addict. Res.* 20:218–25
90. Nutt DJ, Phillips LD, Balfour D, Curran HV, Dockrell M, et al. 2016. E-cigarettes are less harmful than smoking. *Lancet* 387:1160–62
91. O'Brien B, Knight-West O, Walker N, Parag V, Bullen C. 2015. E-cigarettes versus NRT for smoking reduction or cessation in people with mental illness: secondary analysis of data from the ASCEND trial. *Tob. Induc. Dis.* 13:5
92. O'Leary R, MacDonald M, Stockwell T, Reist D. 2017. *Clearing the Air: A Systematic Review on the Harms and Benefits of E-Cigarettes and Vapour Devices*. Victoria, BC, Can.: Univ. Vic. Cent. Addict. Res. BC
93. Parks SH, Duncan DT, Shahawy OE, Lee L, Shearston JA, et al. 2017. Characteristics of adults who switched from cigarette smoking to e-cigarettes. *Am. J. Prev. Med.* 53(5):652–60
94. Pesko MF, Currie JM. 2016. *The effect of e-cigarette minimum legal sale age laws on traditional cigarette use and birth outcomes among pregnant teenagers*. NBER Work. Pap. 22792
95. Pesko MF, Hughes JM, Faisal FS. 2016. The influence of electronic cigarette age purchasing restrictions on adolescent tobacco and marijuana use. *Prev. Med.* 87:207–12
96. Polosa R, Campagna D, Sands MF. 2016. Counseling patients with asthma and allergy about electronic cigarettes: an evidence-based approach. *Ann. Allergy Asthma Immunol.* 116:106–11
97. Polosa R, Morjaria J, Caponnetto P, Caruso M, Strano S, et al. 2014. Effect of smoking abstinence and reduction in asthmatic smokers switching to electronic cigarettes: evidence for harm reversal. *Int. J. Environ. Res. Public Health* 11:4965–77
98. Polosa R, Morjaria JB, Caponnetto P, Caruso M, Campagna D, et al. 2016. Persisting long term benefits of smoking abstinence and reduction in asthmatic smokers who have switched to electronic cigarettes. *Discov. Med.* 21:99–108
99. Primack BA, Soneji S, Stoolmiller M, Fine MJ, Sargent JD. 2015. Progression to traditional cigarette smoking after electronic cigarette use among US adolescents and young adults. *JAMA Pediatr.* 169:1018–23
100. Proctor RN. 2011. *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition*. Oakland: Univ. Calif. Press
101. Reuters. 2016. Philip Morris CEO sketches a future where the company doesn't sell cigarettes. *Fortune*, Nov. 30. <http://fortune.com/2016/11/30/philip-morris-ceo-future-without-cigarettes/>
102. Rose JE, Turner JE, Murugesan T, Behm FM, Laugesen M. 2010. Pulmonary delivery of nicotine pyruvate: sensory and pharmacokinetic characteristics. *Exp. Clin. Psychopharmacol.* 18:385–94
103. RPC (R. Coll. Phys.). 2016. *Nicotine Without Smoke: Tobacco Harm Reduction*. London: RPC. <https://www.rcplondon.ac.uk/projects/outputs/nicotine-without-smoke-tobacco-harm-reduction-0>
104. Russell C, McKeganey N. 2017. *Patterns of cigarette smoking and e-cigarette use among 20,676 adult frequent e-cigarette users in the United States*. Cent. Subst. Use Res., Glasgow, UK. <http://substanceuseresearch.org/usvapuserssurvey>
105. Russell MA. 1976. Low-tar medium-nicotine cigarettes: a new approach to safer smoking. *BMJ* 1:1430–33
106. Smiley SL, DeAtley T, Rubin LF, Harvey E, Kierstead EC, et al. 2017. Early subjective sensory experiences with “cigalike” e-cigarettes among African American menthol smokers: a qualitative study. *Nicotine Tob. Res.* <https://doi.org/10.1093/ntr/ntx102>
107. Spindle TR, Hiler MM, Cooke ME, Eissenberg T, Kendler KS, Dick DM. 2017. Electronic cigarette use and uptake of cigarette smoking: a longitudinal examination of U.S. college students. *Addict. Behav.* 67:66–72
108. Steinberg L. 2007. Risk taking in adolescence: new perspectives from brain and behavioral science. *Curr. Dir. Psychol. Sci.* 16:55–59
109. Strong DR, Pearson J, Ehlike S, Kirchner TR, Abrams D, et al. 2017. Indicators of dependence for different types of tobacco product users: descriptive findings from wave 1 (2013–2014) of the Population Assessment of Tobacco and Health (PATH) study. *Drug Alcohol. Depend.* 178:257–66

110. Talati A, Keyes KM, Hasin DS. 2016. Changing relationships between smoking and psychiatric disorders across twentieth century birth cohorts: clinical and research implications. *Mol. Psychiatry* 21:464–71
111. Tob. Prod. Sci. Advis. Comm. 2011. *Menthol Cigarettes and Public Health: Review of the Scientific Evidence and Recommendations*. Rockville, MD: US Food Drug Adm., Cent. Tob. Prod.
112. Tob. Use Depend. Guidel. Panel. 2008. *Treating Tobacco Use and Dependence: 2008 Update*. Rockville, MD: US Dep. Health Hum. Serv.
113. Trefis Team. 2016. FDA approval for iQOS to be a game changer for Altria. *Forbes*, Dec. 30. <https://www.forbes.com/sites/greatspeculations/2016/12/30/fda-approval-for-iqos-to-be-a-game-changer-for-altria/#385ca26b1a36>
114. Tseng TY, Ostroff JS, Campo A, Gerard M, Kirchner T, et al. 2016. A randomized trial comparing the effect of nicotine versus placebo electronic cigarettes on smoking reduction among young adult smokers. *Nicotine Tob. Res.* 18:1937–43
115. US Dep. Health Hum. Serv. 2001. *Workshop summary: scientific evidence on condom effectiveness for sexually transmitted disease (STD) prevention*. Workshop Summ., July 20, Natl. Inst. Allergy Infect. Dis., Natl. Inst. Health, Dep. Health Hum. Serv., Herndon, VA. <https://chastityproject.com/wp/wp-content/uploads/2013/05/NIH-Condom-Report.pdf>
116. US Dep. Health Hum. Serv. 2010. *How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General*. Atlanta: US Dep. Health Hum. Serv., Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health. <https://www.ncbi.nlm.nih.gov/books/NBK53017/>
117. US Dep. Health Hum. Serv. 2014. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta: US Dep. Health Hum. Serv., Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health. <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf>
118. US Dep. Health Hum. Serv. 2016. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta: US Dep. Health Hum. Serv., Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health. https://e-cigarettes.surgeongeneral.gov/documents/2016_sgr_full_report_non-508.pdf
119. US Dep. Health Hum. Serv. 2017. *FDA announces comprehensive regulatory plan to shift trajectory of tobacco-related disease, death*. News Release, July 28. <https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm568923.htm>
120. US FDA (Food Drug Adm.). 2009. *Division A—Family Smoking Prevention and Tobacco Control Act*. Public Law 111–31, Jun 22. <https://www.gpo.gov/fdsys/pkg/PLAW-111publ31/pdf/PLAW-111publ31.pdf>
121. US FDA (Food Drug Adm.). 2012. Harmful and potentially harmful constituents in tobacco products and tobacco smoke; established list. *Fed. Regist.* 77:20034–37. <https://www.federalregister.gov/documents/2012/04/03/2012-7727/harmful-and-potentially-harmful-constituents-in-tobacco-products-and-tobacco-smoke-established-list>
122. US FDA (Food Drug Adm.). 2013. *Nicotine replacement therapy labels may change*. April 1, US FDA, Silver Spring, MD. https://www.integration.samhsa.gov/health-wellness/NRT_Label_Change_0413.pdf
123. Vanyukov MM, Tarter RE, Kirillova GP, Kirisci L, Reynolds MD, et al. 2012. Common liability to addiction and “gateway hypothesis”: theoretical, empirical and evolutionary perspective. *Drug Alcohol Depend.* 123(Suppl. 1):S3–17
124. Villanti AC, Giovino GA, Burns DM, Abrams DB. 2013. Menthol cigarettes and mortality: keeping focus on the public health standard. *Nicotine Tob. Res.* 15:617–18
125. Villanti AC, Johnson AL, Ambrose BK, Cummings KM, Stanton CA, et al. 2017. Flavored tobacco product use in youth and adults: findings from the first wave of the PATH study (2013–2014). *Am. J. Prev. Med.* 53:139–51

126. Villanti AC, Feirman SP, Niaura RS, Pearson JL, Glasser AM, et al. 2017. How do we determine the impact of e-cigarettes on cigarette smoking cessation or reduction? Review and recommendations for answering the research question with scientific rigor. *Addiction* <https://doi.org/10.1111/add.14020>
127. Villanti AC, Pearson JL, Glasser AM, Johnson AL, Collins LK, et al. 2017. Frequency of youth e-cigarette and tobacco use patterns in the U.S.: measurement precision is critical to inform public health. *Nicotine Tob. Res.* 19:1345–50
128. Villanti AC, Vargyas EJ, Niaura RS, Beck SE, Pearson JL, Abrams DB. 2011. Food and Drug Administration regulation of tobacco: integrating science, law, policy, and advocacy. *Am. J. Public Health* 101:1160–62
129. Vlahov D, Robertson AM, Strathdee SA. 2010. Prevention of HIV infection among injection drug users in resource-limited settings. *Clin. Infect. Dis.* 50(Suppl. 3):S114–21
130. Walton KM, Abrams DB, Bailey WC, Clark D, Connolly GN, et al. 2015. NIH electronic cigarette workshop: developing a research agenda. *Nicotine Tob. Res.* 17:259–69
131. Warner K. 2015. The remarkable decrease in cigarette smoking by American youth: further evidence. *Prev. Med. Rep* 2:259–61
132. Warner KE. 2013. An endgame for tobacco? *Tob. Control* 22(Suppl. 1):i3–5
133. Warner KE. 2016. Frequency of e-cigarette use and cigarette smoking by American students in 2014. *Am. J. Prev. Med.* 51:179–84
134. West R, Hajek P, Foulds J, Nilsson F, May S, Meadows A. 2000. A comparison of the abuse liability and dependence potential of nicotine patch, gum, spray and inhaler. *Psychopharmacology* 149:198–202
135. West R, Shahab L, Brown J. 2016. Estimating the population impact of e-cigarettes on smoking cessation in England. *Addiction* 111:1118–19
136. WHO (World Health Organ.). 2008. *WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package*. Geneva: WHO
137. WHO (World Health Organ.). 2011. *WHO Report on the Global Tobacco Epidemic, 2011: Warning About the Dangers of Tobacco*. Geneva: WHO
138. WHO (World Health Organ.). 2016. *HIV/AIDS: people who inject drugs*. WHO, Geneva. <http://www.who.int/hiv/topics/idu/en/>
139. WHO (World Health Organ.). 2017. *Tobacco*. Updated May, Fact Sheet, WHO, Geneva. <http://www.who.int/mediacentre/factsheets/fs339/en/>
140. Wills TA, Gibbons FX, Sargent JD, Schweitzer RJ. 2016. How is the effect of adolescent e-cigarette use on smoking onset mediated: a longitudinal analysis. *Psychol. Addict. Behav.* 30:876–86
141. Wills TA, Knight R, Sargent JD, Gibbons FX, Pagano I, Williams RJ. 2017. Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tob. Control* 26:34–39
142. Wills TA, Sargent JD, Gibbons FX, Pagano I, Schweitzer R. 2017. E-cigarette use is differentially related to smoking onset among lower risk adolescents. *Tob. Control* 26:534–39
143. Yach D. 2017. Foundation for a smoke-free world. *Lancet* 390:1807–10
144. Zhu S-H, Zhuang Y-L, Wong S, Cummins SE, Tedeschi GJ. 2017. E-cigarette use and associated changes in population smoking cessation: evidence from US current population surveys. *BMJ* 358:j3262



ANNUAL REVIEWS

Connect With Our Experts



New From Annual Reviews:

Annual Review of Criminology

criminol.annualreviews.org • Volume 1 • January 2018

ONLINE NOW!

Co-Editors: Joan Petersilia, *Stanford University* and Robert J. Sampson, *Harvard University*

The *Annual Review of Criminology* provides comprehensive reviews of significant developments in the multidisciplinary field of criminology, defined as the study of both the nature of criminal behavior and societal reactions to crime. International in scope, the journal examines variations in crime and punishment across time (e.g., why crime increases or decreases) and among individuals, communities, and societies (e.g., why certain individuals, groups, or nations are more likely than others to have high crime or victimization rates). The societal effects of crime and crime control, and why certain individuals or groups are more likely to be arrested, convicted, and sentenced to prison, will also be covered via topics relating to criminal justice agencies (e.g., police, courts, and corrections) and criminal law.

TABLE OF CONTENTS FOR VOLUME 1:

THE DISCIPLINE

- *Reflections on Disciplines and Fields, Problems, Policies, and Life*, James F. Short
- *Replication in Criminology and the Social Sciences*, William Alex Pridemore, Matthew C. Makel, Jonathan A. Plucker

CRIME AND VIOLENCE

- *Bringing Crime Trends Back into Criminology: A Critical Assessment of the Literature and a Blueprint for Future Inquiry*, Eric P. Baumer, María B. Vélez, Richard Rosenfeld
- *Immigration and Crime: Assessing a Contentious Issue*, Graham C. Ousey, Charis E. Kubrin
- *The Long Reach of Violence: A Broader Perspective on Data, Theory, and Evidence on the Prevalence and Consequences of Exposure to Violence*, Patrick Sharkey
- *Victimization Trends and Correlates: Macro- and Microinfluences and New Directions for Research*, Janet L. Lauritsen, Maribeth L. Rezey
- *Situational Opportunity Theories of Crime*, Pamela Wilcox, Francis T. Cullen
- *Schools and Crime*, Paul J. Hirschfield

PUNISHMENT AND POLICY

- *Collateral Consequences of Punishment: A Critical Review and Path Forward*, David S. Kirk, Sara Wakefield
- *Understanding the Determinants of Penal Policy: Crime, Culture, and Comparative Political Economy*, Nicola Lacey, David Soskice, David Hope

- *Varieties of Mass Incarceration: What We Learn from State Histories*, Michael C. Campbell
- *The Politics, Promise, and Peril of Criminal Justice Reform in the Context of Mass Incarceration*, Katherine Beckett

THE PRISON

- *Inmate Society in the Era of Mass Incarceration*, Derek A. Kreager, Candace Kruttschnitt
- *Restricting the Use of Solitary Confinement*, Craig Haney

DEVELOPMENTAL AND LIFE-COURSE CRIMINOLOGY

- *Desistance from Offending in the Twenty-First Century*, Bianca E. Bersani, Elaine Eggleston Doherty
- *On the Measurement and Identification of Turning Points in Criminology*, Holly Nguyen, Thomas A. Loughran

ECONOMICS OF CRIME

- *Gun Markets*, Philip J. Cook
- *Offender Decision-Making in Criminology: Contributions from Behavioral Economics*, Greg Pogarsky, Sean Patrick Roche, Justin T. Pickett

POLICE AND COURTS

- *Policing in the Era of Big Data*, Greg Ridgeway
- *Reducing Fatal Police Shootings as System Crashes: Research, Theory, and Practice*, Lawrence W. Sherman
- *The Problems With Prosecutors*, David Alan Sklansky
- *Monetary Sanctions: Legal Financial Obligations in US Systems of Justice*, Karin D. Martin, Bryan L. Sykes, Sarah Shannon, Frank Edwards, Alexes Harris
- *Forensic DNA Typing*, Erin Murphy



ANNUAL REVIEWS | CONNECT WITH OUR EXPERTS

650.493.4400/800.523.8635 (US/CAN)

www.annualreviews.org | service@annualreviews.org





Contents

Symposium

- Commentary: Increasing the Connectivity Between Implementation
Science and Public Health: Advancing Methodology, Evidence
Integration, and Sustainability
David A. Chambers 1
- Selecting and Improving Quasi-Experimental Designs in Effectiveness
and Implementation Research
*Margaret A. Handley, Courtney R. Lyles, Charles McCulloch,
and Adithya Cattamanchi* 5
- Building Capacity for Evidence-Based Public Health: Reconciling the
Pulls of Practice and the Push of Research
Ross C. Brownson, Jonathan E. Fielding, and Lawrence W. Green 27
- The Sustainability of Evidence-Based Interventions and Practices in
Public Health and Health Care
Rachel C. Shelton, Brittany Rhoades Cooper, and Shannon Wiltsey Stirman 55

Epidemiology and Biostatistics

- Selecting and Improving Quasi-Experimental Designs in Effectiveness
and Implementation Research
*Margaret A. Handley, Courtney R. Lyles, Charles McCulloch,
and Adithya Cattamanchi* 5
- Agent-Based Modeling in Public Health: Current Applications and
Future Directions
Melissa Tracy, Magdalena Cerdá, and Katherine M. Keyes 77
- Big Data in Public Health: Terminology, Machine Learning,
and Privacy
Stephen J. Mooney and Vikas Pejaver 95
- Environmental Determinants of Breast Cancer
Robert A. Hiatt and Julia Green Brody 113

Meta-Analysis of Complex Interventions <i>Emily E. Tanner-Smith and Sean Grant</i>	135
Precision Medicine from a Public Health Perspective <i>Ramya Ramaswami, Ronald Bayer, and Sandro Galea</i>	153
Relative Roles of Race Versus Socioeconomic Position in Studies of Health Inequalities: A Matter of Interpretation <i>Amani M. Nuru-Jeter, Elizabeth K. Michaels, Marilyn D. Thomas, Alexis N. Reeves, Roland J. Thorpe Jr., and Thomas A. LaVeist</i>	169

Social Environment and Behavior

The Debate About Electronic Cigarettes: Harm Minimization or the Precautionary Principle <i>Lawrence W. Green, Jonathan E. Fielding, and Ross C. Brownson</i>	189
Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives <i>David B. Abrams, Allison M. Glasser, Jennifer L. Pearson, Andrea C. Villanti, Lauren K. Collins, and Raymond S. Niaura</i>	193
E-Cigarettes: Use, Effects on Smoking, Risks, and Policy Implications <i>Stanton A. Glantz and David W. Bareham</i>	215
Increasing Disparities in Mortality by Socioeconomic Status <i>Barry Bosworth</i>	237
Neighborhood Interventions to Reduce Violence <i>Michelle C. Kondo, Elena Andreyeva, Eugenia C. South, John M. MacDonald, and Charles C. Branas</i>	253
The Relationship Between Education and Health: Reducing Disparities Through a Contextual Approach <i>Anna Zajacova and Elizabeth M. Lawrence</i>	273

Environmental and Occupational Health

Building Evidence for Health: Green Buildings, Current Science, and Future Challenges <i>J.G. Cedeño-Laurent, A. Williams, P. MacNaughton, X. Cao, E. Eitland, J. Spengler, and J. Allen</i>	291
Environmental Influences on the Epigenome: Exposure-Associated DNA Methylation in Human Populations <i>Elizabeth M. Martin and Rebecca C. Fry</i>	309

From Crowdsourcing to Extreme Citizen Science: Participatory Research for Environmental Health <i>P.B. English, M.J. Richardson, and C. Garzón-Galvis</i>	335
Migrant Workers and Their Occupational Health and Safety <i>Sally C. Moyce and Marc Schenker</i>	351
Mobile Sensing in Environmental Health and Neighborhood Research <i>Basile Chaix</i>	367

Public Health Practice and Policy

Commentary: Increasing the Connectivity Between Implementation Science and Public Health: Advancing Methodology, Evidence Integration, and Sustainability <i>David A. Chambers</i>	1
Building Capacity for Evidence-Based Public Health: Reconciling the Pulls of Practice and the Push of Research <i>Ross C. Brownson, Jonathan E. Fielding, and Lawrence W. Green</i>	27
The Sustainability of Evidence-Based Interventions and Practices in Public Health and Health Care <i>Rachel C. Shelton, Brittany Rhoades Cooper, and Shannon Wiltsey Stirman</i>	55
The Debate About Electronic Cigarettes: Harm Minimization or the Precautionary Principle <i>Lawrence W. Green, Jonathan E. Fielding, and Ross C. Brownson</i>	189
Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives <i>David B. Abrams, Allison M. Glasser, Jennifer L. Pearson, Andrea C. Villanti, Lauren K. Collins, and Raymond S. Niaura</i>	193
E-Cigarettes: Use, Effects on Smoking, Risks, and Policy Implications <i>Stanton A. Glantz and David W. Bareham</i>	215
Neighborhood Interventions to Reduce Violence <i>Michelle C. Kondo, Elena Andreyeva, Eugenia C. South, John M. MacDonald, and Charles C. Branas</i>	253
Mobile Sensing in Environmental Health and Neighborhood Research <i>Basile Chaix</i>	367
Policy Approaches for Regulating Alcohol Marketing in a Global Context: A Public Health Perspective <i>Marissa B. Esser and David H. Jernigan</i>	385

Problems and Prospects: Public Health Regulation of Dietary Supplements

Colin W. Binns, Mi Kyung Lee, and Andy H. Lee 403

Health Services

Achieving Mental Health and Substance Use Disorder Treatment Parity: A Quarter Century of Policy Making and Research

Emma Peterson and Susan Busch 421

Data Resources for Conducting Health Services and Policy Research

Lynn A. Blewett, Kathleen Thiede Call, Joanna Turner, and Robert Hest 437

Designing Difference in Difference Studies: Best Practices for Public Health Policy Research

Coady Wing, Kosali Simon, and Ricardo A. Bello-Gomez 453

How Much Do We Spend? Creating Historical Estimates of Public Health Expenditures in the United States at the Federal, State, and Local Levels

Jonathon P. Leider, Beth Resnick, David Bishai, and F. Douglas Scutchfield 471

Modeling Health Care Expenditures and Use

Partha Deb and Edward C. Norton 489

Promoting Prevention Under the Affordable Care Act

Nadia Chait and Sherry Glied 507

Treatment and Prevention of Opioid Use Disorder: Challenges and Opportunities

Dennis McCarty, Kelsey C. Priest, and P. Todd Korthuis 525

Indexes

Cumulative Index of Contributing Authors, Volumes 30–39 543

Cumulative Index of Article Titles, Volumes 30–39 549

Errata

An online log of corrections to *Annual Review of Public Health* articles may be found at <http://www.annualreviews.org/errata/publhealth>

Thank you, honourable members of the committee to allow me to speak today. I am a registered nurse and the founding member Vaping Advocacy and Education Project, better known as VAEP. We are health professionals who produce free learning materials that are easy to understand and based in the scientific evidence. I incorporated this federal not-for-profit 4 years ago and have reviewed hundreds of published articles on tobacco harm reduction.

I have travelled here from Alberta because the intentions to ban flavours and tax eliquid will unintentionally cause far more harm than good. Nova Scotians exceed the national smoking rate of 15% by 3 percentage points. Alarmingly, 1 in 4 males smoke in this province; this is 9% higher than the national smoking prevalence for males.

Smoking causes 85% of lung cancer and 87% of COPD. It is responsible for 36% of lung diseases, 29% of cancers, 14% of heart diseases. It is notable that nonprofits in lung, cancer and heart diseases are the leading proponents in anti-tobacco harm reduction campaigns.

Nicotine does not cause diseases; it is the constituents found in the 7000 chemicals in tobacco smoke that cause diseases. Nicotine is so safe that anyone, including youth, can purchase nicotine gum, patches and inhalers. from drug store shelves.

The current and historical data on vaping repeatedly confirms that vaping is a fraction the risk of smoking; for instance, vaping is less than 1% the cancer risk compared to smoking. The number of adult vapers continues to grow despite the millions of dollars the authorities and health related non-profits have put into fear-based, incomplete narratives that scare smokers away from harm reduction.

As per the youth I have interviewed and further supported by the credible evidence, youth are predominantly using closed pod devices, such as JUUL. These closed pod devices are preferred by youth because they are very small which makes them easy to conceal; they are inexpensive; they can be obtained at stores that are not age restricted; and they have a scant amount of vapor that allows them to use without detection. Most closed pod brand have less than 6 flavours.

In surveys where youth are asked their MAIN reason for trying vaping and they could only choose ONE answer, only 14% selected flavours; while 52% selected: "Just to give it a try". Youth try adult taboos as this is normal human development such as 41% have drank alcohol in the last year.

Alcohol comes in a variety of flavors, again, being flavor diversity driven by adult demand. So, why then are we not seeing a call for the ban of flavored alcohol to curb underage drinking? Youth drink alcohol for reasons such as social acceptance, experimenting with adult behaviors, or sensation seeking.

Vaping is the preferred method of smoking cessation in Canada because it delivers nicotine through inhalation and uniquely mimics the ritualistic smoking behaviour. The vaping industry has been 100% consumer driven and tailor designed by smokers. Approximately 700,000 adult vapers in Canada have demanded the production of the 1000's of flavours and tobacco flavours comprise just a minute portion. Adults predominately use the widely diversified refillable tank devices. These devices use lower nicotine concentration eliquids and produce much larger volumes of vapour than the closed pod devices.

If flavours are banned, vapers will be discouraged from continuing with harm reduction and smokers will be discouraged from switching to harm reduction because the essential element of satisfaction to their taste preferences will be eliminated from what is the most effective nicotine replacement therapy.

As to the proposed tax of \$0.50 per milliliter of eliquid, this tax will make harm reduction as expensive as smoking and smokers will lose another yet incentive to switch. Further, this will shut down the local mom and pop vape shops which supply the smoker with the essential one-to-one service required to guide the smoker to find the right devices and eliquids. These small businesses have helped thousands of Nova Scotian smokers quit smoking where the health community has failed and this specialized service may never be replicated again.

All that will be left will be the closed pod devices that youth like so much and who are predominantly owned by tobacco companies. Tobacco harm reduction will be handed over to tobacco companies.

Smokers face a certain future of smoking-related diseases, years of suffering and very difficult deaths. Desperate smokers seeking to address their nicotine addiction with a vastly safer delivery system will have to turn to the black market which will not be bound to the federal safety regulations.

In closing, the \$322 million in smoking-related tax expenditure this province pays every year will continue and probably rise without a harm reduction alternative. If we transition smokers to harm reduction, that expense disappears.

Thank you for your attention.

Kellie Ann Forbes, BScN, RN

780.562.0288

info@vaepworld.com

VAEPworld.com

From: CA <tonycecchetto@gmail.com>
Sent: Thursday, March 5, 2020 5:14 AM
To: Office of the Legislative Counsel
Subject: bill 233

**** EXTERNAL EMAIL / COURRIEL EXTERNE ****

Exercice caution when opening attachments or clicking on links / Faites preuve de prudence si vous ouvrez une pièce jointe ou cliquez sur un lien

Bill 233

Clause 3 adds electronic cigarettes to the prohibitions against minors possessing tobacco and allows items forfeited to the Crown to be disposed of as the Minister of Health and Wellness directs.

Adding e-cigarette to end of every line in hopes to group them with tobacco products is wrong. Though both combustible cigarettes and ecigarettes have nicotine that is about the only thing they have in common. Cigarettes contain about 7000 chemicals where most eliquid would have 3 main ones then depending on how the flavour profile is would be dependant on how many other added flavours there are. Still a lot less then the 7000 in cigarettes.

Section 3 of Chapter 14 of the Acts of 1993, the Tobacco Access Act, as amended by Chapter 12 of the Acts of 1999, Chapter 58 of the Acts of 2014 and Chapter 26 of the Acts of 2015, is further amended by

(e) "tobacco" means tobacco in any form, intended to be consumed in any manner, and, for greater certainty, includes snuff, tobacco leaves, any extract of tobacco leaves and electronic cigarettes, but does not include any food, drug or device that contains nicotine to which the Food and Drugs Act (Canada) applies;

Electronic cigarettes as much as people like to think they are tobacco they are not. Nicotine may come from the tobacco plant but it is much different then tobacco and it the only thing even related to tobacco in an ecig and like you stated in that section it would not apply to devices that contain nicotine. Just because the Food and Drug act does not apply doesn't mean that an electronic cigarette is now a tobacco product or should be treated as such. Electronic cigarettes are a harm reduction tool that can be used to lower smokers harm when smokers are reluctant to quit. "vaping" has been shown to be at least 95% less harmful then smoking and has also shown to be a proven and effective way to get people to quit all together.

Section 7 of Chapter 14, as amended by Chapter 12 of the Acts of 1999 and Chapter 26 of the Acts of 2015, is further amended by

- (e) tobacco with a nicotine concentration above the amount prescribed in the regulations; or
- (f) an electronic cigarette with a capacity above the amount prescribed in the regulations.

Putting a nicotine cap in place would restrict adults access to harm reduction tools that have proven to be effective in helping smokers quit. Canada already has a 66mg nic cap in place as stated above and showed be followed federally as it would be confusing to have different provinces with different nicotine strength caps as anyone looking to order higher then Nova Scotia is willing to bring in will resulting in residents ordering from out of province manufactures to get their products.

The other thing I will touch on is the electronic cigarette market has been a consumer driven grass roots industry. Lots of items have come from smokers making the switch and developing their own products that they think will help others make the switch to a less harmful alternative. Putting limits on device capacities and how much a device can hold will limit consumers ability to better the products as well as the manufactures making the products.

Chapter 14 is further amended by adding immediately after Section 10 the following Sections:

10A (1) An enforcement officer may seize without a warrant any thing that is produced to the enforcement officer or that is in plain view during an inspection that the enforcement officer believes may be used as evidence of an offence.

If I'm not mistaken this goes against Canada Charter or Rights and Freedoms as I don't think police officers or any officers are allowed to seize anyone's property without following the proper laws in place. Taking peoples items without following laws and warrants could result in serious legal matters for the government and law officials moving forward. Something to consider when making new laws.

As a former asthmatic smoker who struggled with trying to quit for many years, I am very thankful for "vaping" products, electronic cigarettes, electronic nicotine delivery systems (ENDS), or whatever people feel like calling them these days. The issue with calling them vaping products is you can vape a lot of different substances and I'm sure most have heard; vaping nicotine hasn't killed anyone. You might have thought you read that wrong, but you didn't. No nicotine e-liquid was not responsible for any of the lung injuries we seen present themselves in Sept of 2019 and dates moving forward. The CDC finally came forward and confirmed that vitamin acetate in Thc distillate was the cause of it and surprisingly enough governments and media up here in Canada seem very reluctant to face those facts. They continue to demonize and raise fear and panic when it comes to ENDS products and have really hurt the main goal from most of the industry which is if you are a smoker you could quit. Using e-cigarettes has been proven to be more effective then any other NRT (nicotine replacement therapy) on the market to help smokers quit. For those smokers that don't want to quit and have no desire they should switch to an electronic nicotine delivery system that will allow them to consume nicotine, which is the substance they are addicted to, in an at least 95 % less harmful way. Allowing smokers to have access to these products and keeping them affordable is the best solution to have a smoke free Nova Scotia.

If you want to continue to have people smoking which I feel like some of you might after looking at the budget and wanting the 196 mill you make off smokers continue to pass this bill. As for the estimated 4 million your wanting from vaping your not even going to come close to that if you pass this bill. You will effectively destroy this industry with just the proposed tax alone. Doubling the cost of products wont only stop youth from using the products you will stop adults and push adults back to smoking which seems like this is what the plan is anyway.

If you or any of your loved ones have smoked or if anyone in your family has been sent to death by smoking cigarettes please do not send everyone else and their loved ones to that death as well by passing this bill.

Anthony Cecchetto