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Interventions to Prevent Harms from Vaping

Report for the Central East TCAN

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Abstract

The purpose of this review is to explore the current state of knowledge on vaping interventions and to highlight best or promising practices. Academic and grey literatures were reviewed to identify intervention type, targeted population, and measured effectiveness. The search returned limited interventions from Canada but a variety of interventions from other jurisdictions, primarily the United States. Most interventions observed were public education and school-based efforts, which typically were designed to teach youth about the dangers of vaping in the hopes that they refrain from initiating vaping or subsequently stop vaping. Other interventions included community-based interventions, public education, health-care provider interventions, aerosol-free policies, age restrictions, flavour restrictions, advertising and promotion restrictions, labelling and health warnings, and safety requirements. Many of the interventions were embedded in existing tobacco control programs. In most cases, there was insufficient evidence to assess the effectiveness of these interventions to prevent/reduce levels of vaping. Interventions that have been successful at reducing rates of cigarette smoking might hold potential for reducing e-cigarette use and merit future investigation. A preliminary vaping path logic model is one step toward a coordinated and planned vaping strategy.

Interventions to Prevent Harms from Vaping

In 2009, e-cigarettes began to enter the Canadian market. That same year, Health Canada issued an advisory warning of the dangers of nicotine e-cigarettes devices, stating that there was a lack of evidence available to support their safety.¹ More recently, a report from the US National Academies of Science, Engineering and Medicine has stated that the evidence reviewed by the committee suggests “e-cigarettes are not without biological effects in humans”, with dependence being one result of continued use.²

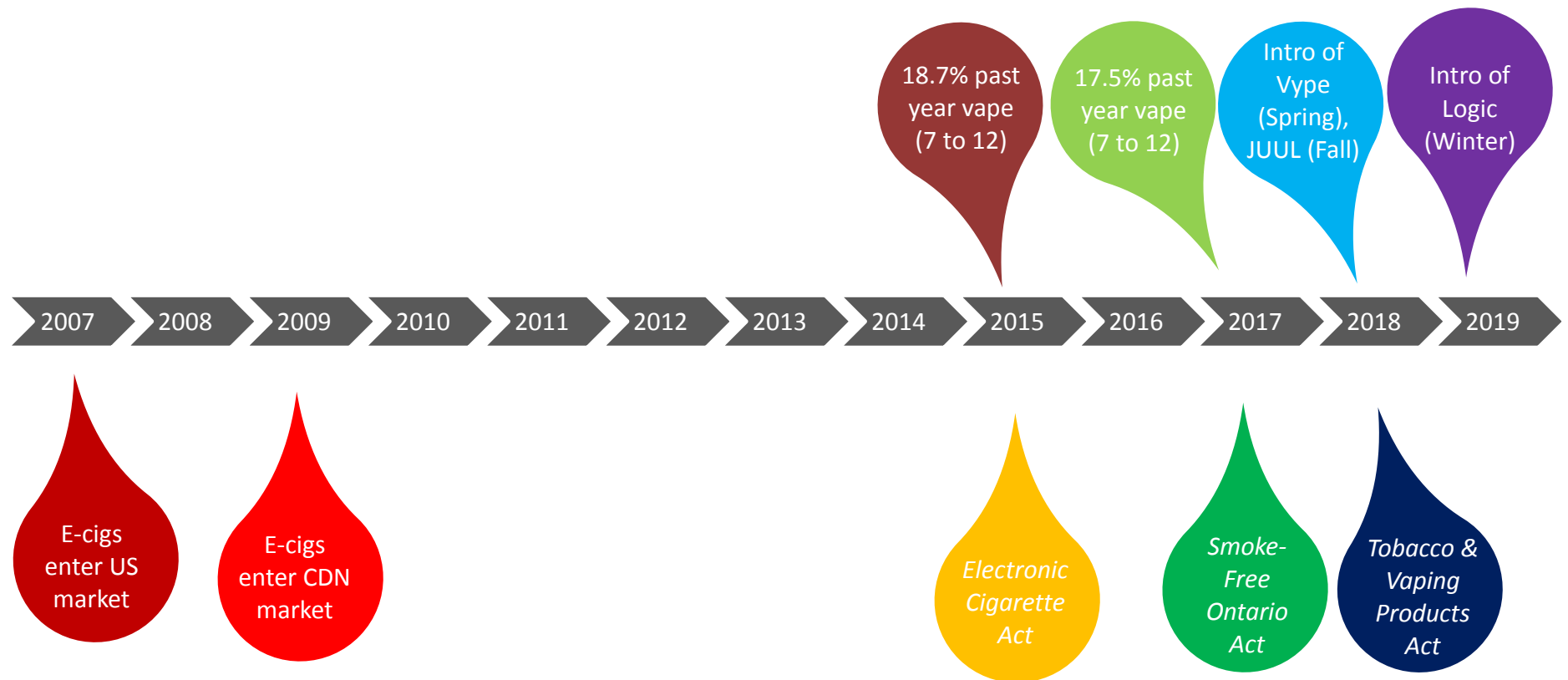
With the recent passage of the federal *Tobacco and Vaping Products Act* in May 2018, vaping products containing nicotine are now allowed to be sold in Canada (prior to enactment, vape products containing nicotine were illegal for sale). One result has been an increase in vaping devices containing nicotine entering the Canadian/Ontario market, in particular at local convenience and gas stations. In September of 2018, JUULⁱ—a company with approximately 75% market share of vaping devices in US chain convenience stores and gas stations³—introduced their brand into the Canadian market. Likewise, Imperial Tobacco Company released Vype in the spring of 2018,⁴ and Japan Tobacco released Logic in early 2019.⁵

Figure 1 shows a selected timeline of the history of e-cigarettes in Ontario.

With this surge of e-cigarette availability at the local level, as well as the associated marketing and promotion of these nicotine containing products, public health representatives have growing concerns about the rise in vaping among young never-smokers. Given this environment, public health organizations have begun to plan and enact interventions to combat this growing epidemic. One critical avenue recognized by local authorities is the need to examine what other leading jurisdictions have done in implementing a public-health response to the uptake of e-cigarette products. To that end, this report reviews the current state of knowledge regarding vaping interventions. Specifically, academic and grey literature were reviewed to identify intervention type, targeted population, and measured effectiveness. This review highlights best or promising interventions that might apply to public health in Ontario and establishes a framework to organize these interventions (a path logic model) and provide a direction for next steps.

ⁱ In late 2018, Altria—the parent company of Phillip Morris and Rothmans, Benson & Hedges—purchased a 35% share in JUUL.

Figure 1: E-Cigarette Timeline, Select Highlights from the United States, Canada, and Ontario, 2007 to 2019



Methods

Review of Academic and Grey Literature

We systematically searched the published academic literature and grey literature databases for information about interventions to prevent harms from e-cigarette vaping. The focus was on interventions to prevent vaping initiation, inclusive of restrictions on places where vaping is allowed. Vaping for the purpose of smoking cessation was not excluded, but we did not search systematically for interventions in this area.

The academic literature search yielded almost no studies of the effectiveness of interventions to prevent harms from vaping. Most of the relevant publications included policy recommendations stemming from studies on e-cigarette use.

The grey literature search produced several creative and promising interventions. However, little information exists about the effectiveness of these interventions. The grey literature search plan was developed to incorporate the following search strategies:

- Customized Google searches
- Targeted websites
- Consultation with experts/key informants

These strategies were loosely adapted from those used in a systematic review of grey literature methodology.⁶ Search techniques included hand-searching and data saturation. A data extraction form was used to manage the search results.

The first search strategy involved conducting Google searches for documents or websites readily available on the Internet. Due to the relevancy ranking involved with a Google search, several search strategies containing multiple combinations of search terms were used. The first three pages for each search's hits were reviewed, using the title and short description. Relevant sources were reviewed and, if appropriate, data were extracted and inputted into the data extraction form.

The second search strategy involved browsing targeted websites of known health organizations and agencies.

The final search technique involved contacting content experts to identify additional information about relevant interventions, other potential items for inclusion and any program evaluation data if available. Nine content experts were contacted by email on January 14, 2019 to seek clarification and to provide additional details.

PHU and TCAN Survey

OTRU circulated a survey to TCAN co-ordinators who, in turn, circulated it to public health units within their TCAN. The survey asked for a brief description of existing e-cigarette interventions by pillar (prevention, protection, and cessation) and the materials developed.

Results

Our search yielded interventions in 10 content areas including:

- School-based interventions
- Community-based interventions
- Public education
- Health-care provider interventions
- Aerosol-free policies
- Age restrictions
- Flavour restrictions
- Advertising and promotion restrictions
- Labelling and health warnings
- Safety requirements

Interventions our review uncovered from jurisdictions outside of Ontario are described below.

Interventions

1. School-Based Interventions

We identified four potential types of school-based interventions:

1. School policy
2. Curricular
3. Bans on e-cigarette use
4. Education/training targeted to school authorities

Policy recommendations from the published literature regarding school policies include prohibiting e-cigarette use:

- On school property
- In private vehicles parked at school
- Within a specific distance of the school
- At sponsored events off school grounds

Six interventions identified in the grey literature provide a variety of promising approaches (Table 1).ⁱⁱ Additional details on these interventions are provided in the text below the table.

Table 1: School-Based Interventions

Intervention	Description	Jurisdiction	Population	Source
The Tobacco Prevention Toolkit	Toolkit to be delivered by educators and aimed toward tobacco, e-cigarettes, and vaping	US (but available online)	For middle and high school students	Stanford University (School of Medicine)
CATCH My Breath Youth E-cigarette Prevention Program	Provides schools with a free curriculum for middle and high schoolers to educate them on vaping	US (but available online)	Ages 11-18	CATCH (Coordinated Approach to Child Health)
Get Smart About Tobacco - Health and Science Education Program	Provides educators and schools with lessons, posters, hands-on experiments and fact sheets about smoking (includes e-cigs)	US (but available online)	For students in grades 3-7	Scholastic
E-Cigarettes: What You Need to Know (Teacher's Guide)	Provides teachers with resources and student materials about e-cigarettes	US (but available online)	For students in grades 6-12	Scholastic
Vaping and JUULING Lesson Plans	Curriculum for teachers to educate about the harms of vaping	US (but available online)	For middle and high school students	Physician Advocacy Network
School E-cigarette Toolkit	Provides tools and resources to address vaping products in schools	Minnesota	School staff, for students	Minnesota Dept. of Health

Tobacco Prevention Toolkit

The **Tobacco Prevention Toolkit** from Stanford Medicine is available to the public for free and contains a specific module focused on e-cigarettes/vapes/pod-based systems, as well as information and resources on nicotine addiction and positive youth development. The toolkit covers basic information about what e-cigarettes/vapes are, chemicals found in vapes and e-juices, and differentiates between the terms vapor and aerosol. Additional topics include the potential health consequences of using e-cigarettes/vapes including thirdhand smoke, advertisements for pod-based systems and how these ads influence youth/young adults. The toolkit provides additional discussion guides and handouts for educators to help students brainstorm how they can say no to using tobacco products and vapes and develop refusal skills. Toolkit users are encouraged to modify the materials to suit their needs, however, all users must follow a Terms of Use to preserve the toolkit logo and material.⁷

ⁱⁱ We thank City of Hamilton Public Health Services for identifying the School E-cigarette Toolkit intervention.

In order to measure the effectiveness of the program, Stanford University is currently collecting evaluation data through pre-post surveys, Google Analytics and a randomized control trial. Preliminary results are expected to be available mid-2019.

CATCH My Breath Youth E-cigarette Prevention Program

The [CATCH My Breath Youth E-cigarette Prevention Program](#) targets students aged 11-18 years old and is free of cost. The program goal is to increase student knowledge of e-cigarettes, nicotine, addiction and the related dangers. With an increase in knowledge, the program assumes that youth will develop skills to resist media influences and peer pressure to initiate e-cigarette use.

The program content is based on best practices for tobacco awareness. CATCH My Breath offers a curriculum composed of four lessons (PowerPoint format), each providing approximately 30 minutes of instruction. Secondary to the curriculum, the program offers in-class activities, teacher education, online resources and take-home material intended for parents (Appendix A contains a sample take-home activity).

The program content includes information about e-cigarettes including potential harms and adverse health effects, understanding marketing strategies targeted at youth, and techniques to develop refusal skills. The program content was developed by the University of Texas Health Science Center at Houston School of Public Health.

The content was developed to be taught by school educators and to provide parents with information to support the lessons learned in class. CATCH My Breath has developed an hour-long training module, delivered online via webinar, for educators who intend to implement the program.

In 2016, pilot data was collected from 26 schools (2,255 students in grades 6-8) across 5 states. Important findings from the pilot data include:

- 91% of teachers agreed or strongly agreed that the lessons were culturally appropriate for their students
- 91% of teachers agreed or strongly agreed that they felt confident in their ability to teach the curriculum
- 68% of teachers agreed or strongly agreed that their students enjoyed the lessons

- 86% of students are less likely to use e-cigarettes after completing the program
- 86% of students know more about e-cigarette use after completing the program
- 82% of students will look at e-cigarette ads differently
- 70% of students discussed what they learned with family or friends

Get Smart About Tobacco

The [Get Smart About Tobacco](#) initiative is a health and science education program designed by Scholastic for teachers Get Smart About Tobacco in Grades 3 to 7. This initiative, based on lessons in the classroom, includes educational information and worksheets on tobacco and e-cigarettes and the potential dangers (Appendix B contains a sample worksheet). The initiative also includes critical-thinking discussion questions about e-cigarettes such as “Why is it sometimes difficult to make health decisions about e-cigarettes?” “How do you think people’s attitudes about electronic cigarettes will change over time?” and “Why might teens not know the risks of e-cigarettes?” Answers are provided for the discussion questions although there is no indication what source of information was used to develop the answers. Pre- and post-assessment survey tools are available to teachers, who can submit results to Scholastic for the chance to win a Scholastic gift certificate (results of the surveys are not known).

E-Cigarettes: What You Need to Know (Teacher’s Guide)

Scholastic’s [Teacher’s Guide](#) is designed for teachers in Grades 6 to 12. It includes informational text and articles for students, student worksheets, critical-thinking questions (including answer keys), vocabulary lists, and reading suggestions. This initiative addresses key educational standards including English language arts (e.g., textual evidence, writing informative texts), science (e.g., chemical processes in everyday life), education (e.g., personal and community health) and social studies (e.g., production, distribution, and consumption).

Vaping and JUULING Lesson Plans

The Physician Advocacy Network developed [Vaping and JUULING Lesson Plans](#) for middle and high school teachers to teach students about the harms of vaping. The content is a combination of a lesson plan for teachers to follow and a PowerPoint slide deck to guide in-class instruction (Appendix C contains the lesson plan). No evaluation data are being collected. The Physician Advocacy Network simply provides the PowerPoint to educators for use in their classrooms.⁸

School E-cigarette Toolkit

The Minnesota Department of Health’s [School E-cigarette Toolkit](#) is for school staff including administrators, educators, teachers and health-services staff. The toolkit aims to educate users on e-cigarettes and nicotine and provides information on the following topics: reviewing and strengthening current policies, updating curriculum/lesson plans, promoting resources for parents, promoting health messaging in schools, and educating students.

2. Community-Based Interventions

Recommendations from the formal literature relevant to community-based programming include stronger enforcement of youth access laws, online marketing, and age verification to alter the perception that these products are easy to access. The grey literature search produced only one community-based intervention (Nicotine Anonymous Meetings), which we categorized as a cessation program. In a recent webinar sponsored by the US Substance Abuse and Mental Health Services Administration (SAMHSA), Donna Vallone, from the Truth Initiative, discussed three online digital platforms from TRUTH that seek to support e-cigarette quitters of all ages (Table 2).⁹

Table 2: Community-Based Interventions

Intervention	Description	Jurisdiction	Population	Source
Nicotine Anonymous Meetings	Meetings based on the 12-step program adapted from AA. The purpose is to help individuals who want to stop using nicotine products	US and Canada (Ontario, Saskatchewan, BC)	Adults	Nicotine Anonymous
This is Quitting	Text message program, digital resources	US	Vapers 17 years or older	Truth Initiative
BecomeAnEX	Email/text message program, digital resources	US, but open to anyone	Vapers	Truth Initiative
EX Program	Text message program, digital resources, 1 on 1 chat with treatment specialists and NRT fulfillment	US	Employers and health plans	Truth Initiative

3. Public Education

We identified five types of public education interventions:

- Social media campaigns

- Mass media campaigns
- Video games
- Online courses
- Earned media

Policy recommendations about public education from the formal literature include publishing health information and promotion on social networking sites (e.g., Facebook, Twitter, Instagram, YouTube) to identify and educate adolescents who display, consider, or engage in e-cigarette use. Exposure to risk behaviour on social networking sites has a direct impact on adolescents' risk behaviours.

Ten public education interventions were identified in the grey literature (Table 3),ⁱⁱⁱ all of which use a variety of approaches including paid ads, social media, and resource guides, and other written material (e.g., posters and fact sheets). More detail is provided on nine of these interventions below the table.

Table 3: Public Education

Intervention	Description	Jurisdiction	Population	Source
smokeSCREEN	An e-cigarette and smoking prevention videogame focusing on peer pressure and decision making	Worldwide - online	Ages 10-16	Yale University - Center for Health and Learning
The “Real Cost” Youth E-Cigarette Prevention Campaign	Focused on de-bunking myths and provides materials for use in high schools in the United States	US (but available online)	Youth aged 12-17	FDA
Escape the Vape	Provides education on vaping and chemical contents in a youth/child friendly way	Online website	Youth and Children	Seattle and King County Public Health
Student online vape & e-cigarette diversion/ educational program	Videos and downloadable material to be used for educational opportunity	US (but available online)	Youth	Chandler Coalition on Youth Substance Abuse (CCYSA)
Vanish the Vape	The campaign seeks to educate students and families on the consequences and dangers of vaping using presentations, posters, social media and videos	Tempe, Arizona, US	High school students	Tempe Union High School District

ⁱⁱⁱ We thank City of Hamilton Public Health Services for identifying three of these interventions: Flavors Hook Kids, E-Cigarettes and Teens: A Guide for Parents and Educators, and What You Need to Know and How to Talk with Your Kids about Vaping.

Generation FREE	Youth-led campaign to prevent vaping/tobacco use and provide education	Mississippi, US	High school and university students	The Partnership for a Healthy Mississippi
Health Canada	Paid and social media ads and fact sheets to youth, parents and vapers	Canada	Youth, parents, vapers	Health Canada
Flavours Hook Kids	Informs parents about the availability of flavoured tobacco products targeting teens, ease of obtaining and actions parents can take	California, US	Parents, concerned adults, and youth	California Department of Public Health
E-Cigarettes and Teens: A Guide for Parents and Educators (PDF)	A resource guide for parents, educators, and prevention professionals who work with teens and pre-teens	US	Parents, educators and prevention professionals	Safe Kids America, 2014
What You Need to Know and How to Talk with Your Kids about Vaping	A resource guide designed for parents to help them understand the risks of vaping for teens/young adults	US	Parents, for teens and young adults	Partnership for Drug-Free Kids, 2018

smokeSCREEN

smokeSCREEN is an innovative video game developed by Yale University’s Center for Health and Learning and implemented in 2018. This public-education intervention aims to prevent e-cigarette use by challenging users to work through simulated real-life situations and dangers that can occur when youth vape. The videogame is available online, free of cost, typically takes four hours to complete and targets children and youth aged 10-16.^{10,11}

In the videogame, the player creates a virtual character. The virtual character engages in conversations and events in a school setting. The participant’s goal is to help their character navigate through the difficult situations that he/she encounters (Appendix D contains a sample of the videogame content). The videogame is intended to provide the participant with skills that they can apply in their real lives and to help them avoid e-cigarette initiation.^{10,11}

Short term evaluation data suggests that the smokeSCREEN videogame helps avoid risky behaviours that lead to vaping. Some positive effects have included changes in beliefs, knowledge and intentions regarding e-cigarette use and vaping. Findings suggest that the videogame is a promising intervention to prevent e-cigarette use in youth.¹¹

The “Real Cost” Youth E-Cigarette Prevention Campaign

The “Real Cost” Youth E-Cigarette Prevention Campaign from the FDA focuses on debunking myths about e-cigarette use among youth and is composed of online video ads, digital and social

media content, and materials for use in high schools such as posters. The campaign uses YouTube, Instagram and Facebook to promote messaging on the dangers of vaping.

The “Real Cost” Smoking Prevention Campaign was successful in reducing cigarette smoking among youth, having prevented 350,000 youth from smoking initiation between 2014 and 2016 alone.¹² In the hopes of reducing the rise in e-cigarette use by youth, the “Real Cost” Campaign was extended and improved to focus on youth vaping.¹³

The vaping-focused campaign launched in 2018 and conveys messages about the risks of using e-cigarettes, the consequences of nicotine on youth development, and the adverse health effects (Appendix E contains a sample poster). The campaign is designed to reach youth online through their social media feeds and in schools through posters and advertisements. The digital and print media were provided to more than 10,000 high schools across the United States and is projected to reach 10.7 million youth who currently use e-cigarettes or have intentions to try them.^{13,14}

The “Real Cost” campaign is rooted in harm reduction principles—by providing youth with the knowledge and education about vaping and e-cigarettes, they will be prepared to make educated decisions.¹⁴

Links to The “Real Cost” campaign material can be found on [Facebook](#), [Instagram](#) and [YouTube](#).

Escape the Vape

[Escape the Vape](#), created by Seattle and King County Public Health, is a publicly available free website designed to inform youth and children about vaping. The website provides information about vaping, the chemical contents of e-juice and the health-related dangers of vaping. The information is provided through use of catchy characters and illustrations, designed to attract children. The accuracy of the information on the website has not been verified.

Vanish the Vape

Implemented in September 2018, [Vanish the Vape](#) was developed by Tempe Union High School District. The campaign was developed in response to a high level of vaping in/at schools and with the intent of reducing disciplinary incidents for vaping on campus.¹⁵

The campaign goals are to a) inform students and families of the consequences of vaping or bringing vaping paraphernalia on high-school campuses, and b) educate students and parents about the dangers of vaping and e-cigarettes. The campaign included handing out flyers at school, providing handouts for parents, the use of videos and educational material (websites), paid advertisements in local newspapers and developing social media campaign content on Facebook, Instagram and Twitter.¹⁵

Data collected between September and December 2018 showed a 30% reduction in vaping related discipline incidents.¹⁵

Generation FREE

Mississippi's [Generation FREE](#) is a youth-led campaign to prevent vaping and tobacco use among youth by providing educational information and public service announcements. The campaign is targeted at both high-school and university students. With catchy public service announcements and headlines like “we get it, you vape”, Generation FREE aims to challenge the increasing interest in and normality of vaping. The content is delivered on the campaign's website and social media accounts including snapchat, Twitter, and Instagram.

Health Canada

[Health Canada's vaping campaign](#) includes paid and social media ads urging parents to talk to their children about the health risks associated with vaping (e.g., “Talking with your teen about vaping” fact sheet) and a video directed toward youth with the message, “Consider the consequences of vaping It's your life. Why risk it?” The Health Canada website also includes content about “Resources for parents,” “What is vaping,” “Risks of vaping,” and “Vaping and quitting smoking.” The campaign will include hands-on learning events in high school and community venues, targeting youth between the ages of 13 and 18. Social media influencers will also be part of the campaign to reach parents and teens.

Flavors Hook Kids

The [Flavors Hook Kids](#) campaign from the California Department of Public Health warns parents and concerned adults about the availability of flavoured tobacco products targeting teens, teens' ease of obtaining these products online, and actions parents can take such as writing a letter of concern to their mayor or joining a local tobacco control coalition.

This comprehensive campaign, which appears in 7 languages (English, Spanish, Mandarin, Cantonese, Korean, Vietnamese and Tagalog), features television spots, radio, out-of-home advertising, and a dedicated website to distribute information about these products.

E-Cigarettes and Teens: A Guide for Parents and Educators

A [resource guide](#) (PDF) for parents, educators, and prevention professionals who work with teens and pre-teens. Topics covered include the e-cigarette delivery system, e-cigarettes and cannabis, and nicotine and the teen brain. Published in 2014, this resource guide is somewhat dated.

What You Need to Know and How to Talk with Your Kids about Vaping

A [resource](#) produced by Partnership for Drug-Free Kids in 2018, designed for parents to help them understand vaping, its appeal to youth, and known risks. The guide also includes information on cannabis and vaping, clues about whether a child is vaping, what parents can do to safeguard their children, and answers to common questions children might ask parents (e.g., They are just flavorings, so what is the big deal? Isn't vaping safer than smoking cigarettes?).

4. Health-Care Provider Intervention

The grey literature search yielded one health-care provider intervention (Table 4). No evidence of effectiveness was available.

Table 4: Health-Care Provider Interventions

Intervention	Description	Jurisdiction	Population	Source
Tobacco Free Futures Guidelines (PDF, 5As Approach)	A model for practitioners to discuss tobacco (includes e-cigs) intervention with youth patients	Alberta, Canada	Ages 10-17	Alberta Quits

5. Secondhand Aerosol-Free Policies

Although secondhand vapour has been a term used by some jurisdictions, a more accurate term is secondhand aerosol. Some may view “vapour” as limited to the gaseous phase of water, which is inaccurate when describing secondhand aerosol from e-cigarette devices. In Ontario,

secondhand aerosol prohibitions have been added to prohibitions on smoking under the 2018 *Smoke-Free Ontario Act*. Vaping (or smoking) is prohibited in:

- Enclosed public places and workplaces
- School property (buildings and grounds)
- Indoor common areas of condominiums, apartment buildings, and university or college residences
- Child-care centres including home-child care
- Reserved seating areas of sports arenas or entertainment venues
- Motor vehicles while someone under the age of 16 is present
- Children’s playgrounds or public areas within 20 metres of a children’s playground
- Within 9 metres of any entrance or exit of a public or private hospital, psychiatric facility, long-term care home or independent health facility

Public health units maintain primary responsibility for education and enforcement.

6. Age Restrictions

Two broad types of interventions related to age restrictions:

- Minimum age for purchase (Table 5)
- Minimum age for access to outlets that sell

Minimum Age

Table 5: Age Restrictions: Minimum Age

Intervention	Description	Jurisdiction	Population	Source
Raising minimum age (for purchase) - Age restrictions	Several American states have increased the age of purchase for vaping products	US - Must be 21 in the following states: California, Hawaii, Oregon, New Jersey, and Maine	Under 21	Various

Minimum Age for Access

In the US, the Food and Drug Administration is proposing that sales of flavoured e-cigarettes (excluding mint, menthol and tobacco flavours) at retail be prohibited in stores that youth can

legally access, unless for sale in an area with no access to underage youth.

7. Flavour Restrictions

The United States Food and Drug Administration is considering a ban on flavours that appeal to youth. In Canada, the *Vaping and Tobacco Products Act* prohibits the promotion of vaping products that use flavour category descriptors such as candy, dessert, and soft drink flavours.¹⁶

8. Advertising and Promotion Restrictions

Federal law allows the advertising and promotion of vaping products but bans lifestyle advertising and advertising that appeals to youth. In Ontario, provincial legislation allows for the point-of-sale promotion, but not display, of product. Other provinces have banned point-of-sale promotion. We did not find evidence of the effects of restrictions on advertising and promotion of e-cigarettes. Restrictions would likely have similar effects to restrictions on tobacco advertising and promotion.

9. Labeling Requirements – Health Warnings/Health Claims

Both the United States and the European Union have stipulations requiring warnings about nicotine addiction and possible health effects. In Canada, the Federal Government is developing health warning regulations. We did not find evidence of effects of health warnings for e-cigarettes. Health warnings would likely have similar effects to those for tobacco.

10. Safety Requirements

Child-proof packaging for both devices containing e-liquid and e-liquid refill containers is a safety requirement in several jurisdictions. Under the European Commission's Tobacco Products Directive:

- (40) Electronic cigarettes and refill containers could create a health risk when in the hands of children. Therefore, it is necessary to ensure that such products are child- and tamperproof, including by means of child-proof labelling, fastenings and opening mechanisms.

- (41) In view of the fact that nicotine is a toxic substance and considering the potential health and safety risks, including to persons for whom the product is not intended, nicotine-containing liquid should only be placed on the market in electronic cigarettes or in refill containers that meet certain safety and quality requirements. It is important to ensure that electronic cigarettes do not break or leak during use and refill.

No interventions were found in the published or grey literature that address the utility or functioning of child-proof packaging relating to e-liquids.

Interventions: Ontario

Twenty of 35 public health units surveyed provided information on e-cigarette resources, programs, or policies that they have implemented within their health unit. Table 6 below provides a general overview. There were very few formal programs or interventions, with most activities being small-scale resources (posters, fact sheets, web pages, etc.). Most activities reported in Table 6 appeared to have been produced in-house at the health unit level. For a number of health units, some resources were being shared within a TCAN, and sometimes among health units from different TCANS. A small number of health units were using resource material developed by third parties, some of which are referred to in the tables presented earlier (e.g., Grey Bruce: Catch My Breath Youth E-cigarette Prevention Program; North West TCAN: Stanford Medicine's The Tobacco Prevention Toolkit; North West TCAN: Scholastic's E-Cigarettes: What You Need to Know (Teacher's Guide)).

Table 6: Select Ontario Activities/Interventions

	School						Community		Public Education			Health Care Provider	Aerosol Free Policies	Vendor	Age Restrictions	
	Response	School policy	Curricular	Student program or resources	Parent resources	School authority resources	School authority toolkit	Youth	Other	Internet/ Social media	Mass media	Posters/ resources	Policies	Education	Education	Enforcement
TCAN PHU																
Central East																
Durham Region	1	1		1		1				1				1		
Haliburton, Kawartha, Pine Ridge																
Peel	1									1		1		1		
Peterborough																
Simcoe Muskoka	1			1	1	1				1					1	
York Regional	1		1	1	1	1		1	1	1		1				
Central West																
Brant																
Haldimand-Norfolk																
Halton Regional	1		1	1	1	1				1		1				
Hamilton	1			1				1		1						
Niagara Region	1			1		1						1				
Waterloo																
Wellington-Dufferin-Guelph	1		1	1		1				1		1				

	School			Community		Public Education			Health Care Provider	Aerosol Free Policies	Vendor	Age Restrictions				
	Response	School policy	Curricular	Student program or resources	Parent resources	School authority resources	School authority toolkit	Youth	Other	Internet/ Social media	Mass media	Posters/ resources	Policies	Education	Education	Enforcement
TCAN PHU																
Eastern	1									1						
Eastern Ontario	1			1	1	1						1				
Hasting, Prince Edward																
Kingston, Frontenac, Lennox & Addington	1					1				1	1	1	1	1	1	
Leeds, Grenville, Lanark	1			1	1	1				1	1		1	1		
Ottawa	1			1	1	1				1				1		
Renfrew	1			1		1					1		1	1	1	1
North East																
Algoma																
North Bay Parry Sound	1			1	1	1		1		1	1			1		
Porcupine																
Sudbury	1			1	1	1						1				
Timiskaming																
North West	1									1	1	1		1		1
Northwestern	1			1	1					1	1	1				1

	School							Community	Public Education			Health Care Provider	Aerosol Free Policies	Vendor	Age Restrictions	
	Response	School policy	Curricular	Student program or resources	Parent resources	School authority resources	School authority toolkit	Youth	Other	Internet/ Social media	Mass media	Posters/ resources	Policies	Education	Education	Enforcement
TCAN PHU																
Thunder Bay	1			1	1	1			1	1	1	1		1	1	1
South West																
Chatham-Kent																
Elgin-St. Thomas																
Grey Bruce	1		1	1						1						
Huron County																
Lambton																
Middlesex-London	1	1a	1a	1a	1a	1a	1			1	1					
Oxford County																
Perth																
Windsor-Essex County																
Toronto	1				1	1						1				

Note: This table reports a mix of resources, programs and policies ranging from comprehensive to minor (e.g., a developed intervention to a single fact sheet), which makes it difficult to compare interventions by health unit (not the intended purpose of the table). Further, only select health units responded (n = 20, as indicated by Response = 1). Interpret table with care.

At Risk Populations

Based on the most recent national data available from the 2017 Canadian Tobacco, Alcohol and Drug Survey (CTADS),¹⁷ 15% of the Canadian population aged 15 years and over have ever-tried an e-cigarette, with 23% of youth aged 15 to 19 and 29% of young adults aged 20 to 24 having ever-tried. Among current or former smokers, 32% reported e-cigarette use as a cessation aid in the past two years.

In 2016/17, 10% of Canadian students in grades 7 to 12 used an e-cigarette in the past 30 days, a significant increase over that reported in 2014/14 at 6%.¹⁸ Males had a higher rate of past 30-day use of e-cigarettes than females (12% vs. 8%, respectively), and students in grades 10 to 12 had a higher rate than students in grades 7 to 9 (15% vs. 5%, respectively).¹⁸

Among Ontario students in grades 7 to 12, 17.5% used e-cigarettes in the past year.¹⁹ Rates of past-year use differed by grade, with higher grades having higher rates for both vaping and cigarette smoking (Table 7). Initiation to vaping relative to cigarette smoking appears to start in earlier grades. For example, among students in grades 7 to 8, 3.9% vaped in the past-year but only 1.4% smoked cigarettes (interpret with caution, marginal estimate); among students in grade 9, 15.8% vaping but only 6.2% smoked cigarettes.¹⁹ These data suggest that vaping prevention interventions could begin earlier than more traditional tobacco prevention interventions.

Table 7: Past-Year Vaping and Smoking Behaviour, Grades 7 to 12, Ontario, 2017

Grade	Vape (Past Year)				Smoke (Past Year)			
	%	LCL	UCL	Pop	%	LCL	UCL	Pop
Grades 7-8	3.9 M	2.4	6.2	9200	1.4 M	0.9	2.3	3600
Grade 7	S				1.6 M	0.9	2.9	2000
Grade 8	5 M	3	8.2	6300	S			
Grade 9	15.8	12	20.8	17800	6.2	4.6	8.3	9100
Grade 10	21.7	17	27.1	24900	10.6	8.6	13	16000
Grade 11	26.9	21	33.4	33100	18.1	13.8	23.4	28300
Grade 12	28.3	24	33.3	47500	23.4	19.3	28.2	49000

M = Marginal estimate. Interpret with caution: subject to moderate sampling variability

S = Suppressed due to extreme sampling variability.

Source: Ontario Student Drug Use Survey 2017. Available from the [Tobacco Informatics Monitoring System \(TIMS\)](#)

Discussion

Most interventions observed in our review of the academic and grey literature were school-based and public education efforts that frequently appeared to be designed to teach youth about the dangers of vaping and to encourage them to refrain from initiating vaping or to stop vaping if they already used e-cigarettes. Only a moderate amount of information is available on the robustness of these kinds of interventions, with stronger information available when the intervention focuses more broadly on tobacco or smoking. School based and public education vaping interventions appear to strongly apply to public health. Table 8 provides a brief summary of the types of interventions we observed in the literature, an approximation of the existing knowledge of these types of interventions, and their relevance to TCANS and PHUs.

Table 8: Intervention Type by Existing Knowledge and Relevance to PHUs

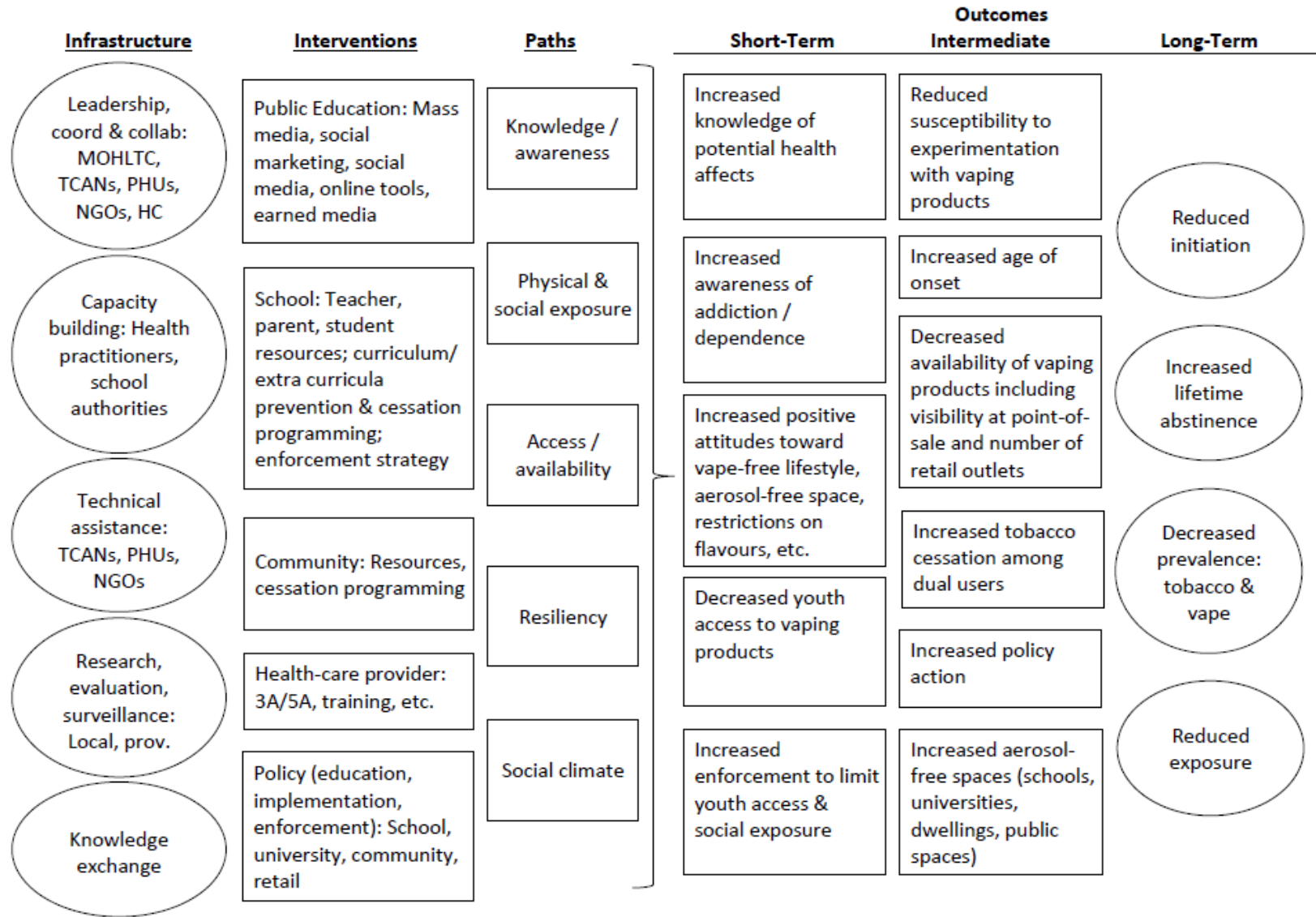
Intervention Type	Knowledge from Existing Examples	Relevance to TCAN / PHU Activity
School-based Programming	Moderate	High
Community-based Programming	Low	High
Public Education	Moderate	High
Health Care Provider	Low	Moderate/High
Aerosol-free Policies	High	High (enforcement)
Age Restrictions	High	High (enforcement)
Flavour Restrictions	Low	?
Advertising & Promotion Restrictions	High	?
Labelling & Health Warnings	Moderate	Low
Safety Requirements	Moderate	Low

In general, several of the interventions in our review appeared to be tobacco interventions that were re-developed/applied to e-cigarettes. The extent to which evidence of effectiveness for similar interventions for tobacco cigarettes can be extrapolated to e-cigarettes is not known. If interventions have been successful at reducing rates of cigarette smoking, there is a potential that they will be successful at reducing rates of vaping. Differences between cigarette and e-cigarette interventions in contexts, evidence and environments need to be carefully examined before adoption.

To aid the reader's understanding of what a vaping strategy might look like, we created a vaping path logic model (Figure 2), which includes infrastructure; interventions; paths (which lead to outcomes); and short, intermediate and long-term outcomes. Given the early state of e-cigarette intervention research and evaluation, the Infrastructure component is particularly relevant. For instance, leadership and coordination at the provincial, regional, and local level is needed to provide direction; build capacity; develop strategies and plans; and to assess, design, implement and evaluate promising and developed interventions.

Vaping has made significant inroads in Ontario since it emerged onto the scene about a decade ago. Compared to tobacco, vaping rates are higher among students in earlier grades, which suggests prevention interventions for vaping should start earlier than those for cigarettes. Current vaping rates are particularly high among older teens and young adults, which suggest that vaping might be influenced by their socio-ecologic position in society. Effective future interventions will need to address the complex interplay of factors that can encourage vaping, such as the school/university environment, peer pressure, family factors, social media, and product marketing. To accomplish this, a coordinated and planned strategy will be vital to this work.

Figure 2: Vaping Path Logic Model, Ontario



Appendix A – CATCH My Breath: Sample of a Take-Home Activity

CATCH[®] MY BREATH

Handout 2, Session 2

Adult Interview

Ever wonder what it was like to be a young person in your parent’s day and age—back in the “old days” before smart phones and the Internet? Do you think your parents had to make tough decisions about whether to use tobacco? Now is your chance to find out. Your assignment is to ask a parent (or another adult you know) the questions listed below. Write the answers on this sheet. You will share the information with your class in the next CATCH My Breath session.

Name of person you are interviewing and their relationship to you.

-
1. Have you ever tried tobacco - even a puff? (Yes or No)
(If NO, skip ahead to question 5.)
 2. How old were you when you first tried tobacco? _____
 3. What influenced you to try tobacco?

4. Did you become a regular user of tobacco? (Yes or No)
 - a. Have you ever tried to quit using tobacco? (Yes or No)
 - b. Did you feel you were addicted to the nicotine in tobacco? What did it feel like to stop using tobacco once you were addicted?

5. Have you heard of E-cigarettes? If so, what have you heard?

6. What pressures do you think people my age might feel to make them experiment with E-cigarettes? Peer pressure? Pressure from advertising? Pressure from role models?

7. What advice would you give someone my age who is thinking about trying an E-cigarette or tobacco?

Appendix B – Get Smart About Tobacco: Sample Worksheet

Worksheet 3

Name: _____

MAKING SMART DECISIONS

What would you do or say if you were faced with a potentially risky situation involving tobacco? It can be helpful to make a plan beforehand so that you are better prepared to react on the spot.

Read the scenarios below. What could you say if you were in the situation to help you and the people around you stay safe from tobacco? On a separate piece of paper, write a paragraph explaining how you would respond to each scenario. Using facts can help strengthen your argument when you are saying no to something. Be sure to support your answer with facts about the dangers of tobacco and related products.

Scenario 1:

Ashley is going to her friend Natalie's house. Natalie's sister Lauren is home from college and has some friends over. When Ashley arrives at Natalie's, she notices that Lauren and her friends have been smoking in the house.

Natalie: Come in! I just made popcorn and started a movie.

Ashley: Um...

Natalie: What's the matter? Don't worry. Lauren and her friends are leaving. I opened the windows to get rid of the smoke smell.



Should Ashley stay at her friend's house, where people have been smoking?

Write a paragraph explaining the risks. What would you do or say if you were in this situation?

Scenario 2:

Sam is in a convenience store with his older brother, Jackson, and his brother's high school friend Luke. They are looking at a display of e-cigarettes.

Jackson: Hey, have you ever tried e-cigarettes?

Luke: No, but I'm not going to get hooked on them, so they're not a big deal.

Sam: But Jackson, isn't smoking bad for you?

Jackson: E-cigarettes aren't dangerous like real ones, Sam. You don't breathe in tobacco smoke, so they must be safe.



What do you think about the older boys' claims about e-cigarettes? What should Sam say?

Write a paragraph explaining why teens should avoid e-cigarettes. What dangers do they pose?

Appendix C – Physician Advocacy Network’s Vaping and JUULing Lesson Plan

Lesson Plan: Vaping and JUULing

Subject: Health and Well-being

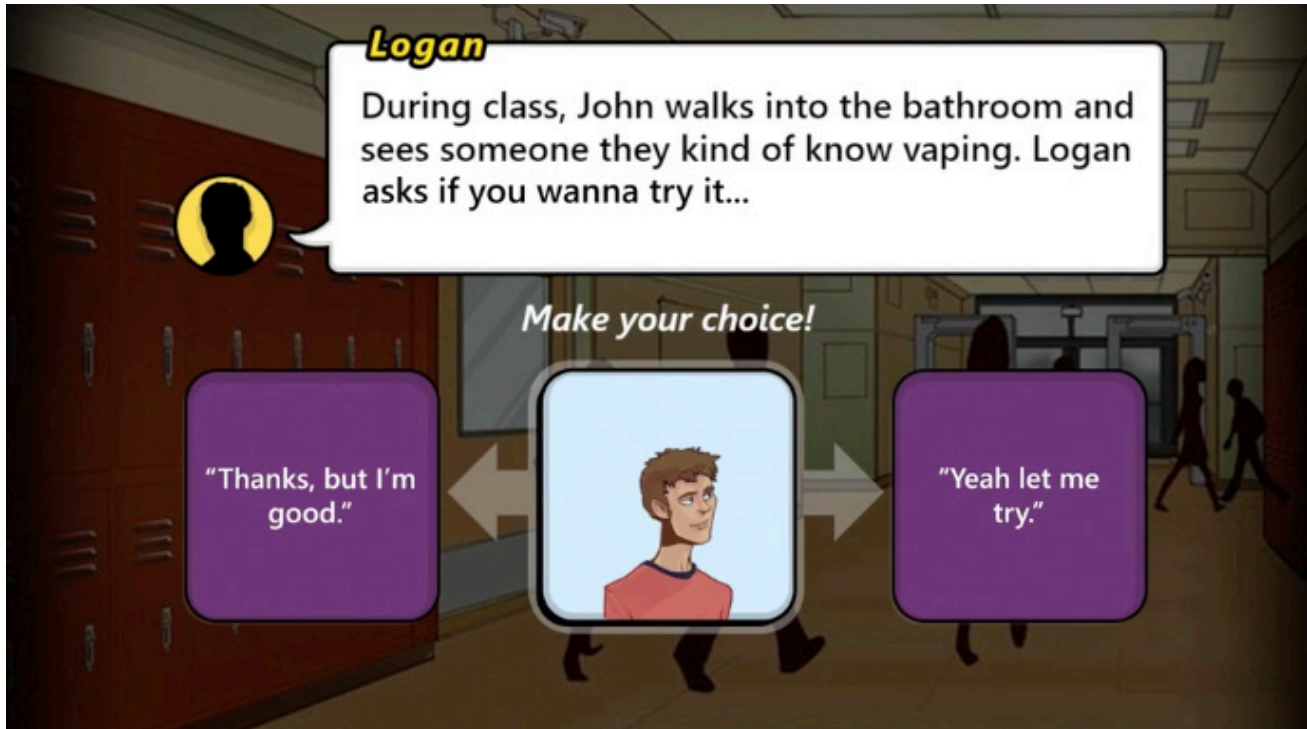
Total Time: 1 hour

Learning Objectives	<ol style="list-style-type: none"> 1. Describe vapes and JUULs 2. Identify key ingredients in vapes and JUULs and how they affect the human body 3. Identify specific health and medical risks associated with vaping and JUULing
Materials Needed	<ul style="list-style-type: none"> • Post-it notes • “What’s in e-liquid?” cards • White board • Projector and laptop
Overview of Lesson	<ul style="list-style-type: none"> • Warm-up activity: Post-its and True/False (10 mins) • Presentation on vaping and JUULing (5 mins) • “What’s in e-liquid?” activity (10 mins) • Finish presentation on vaping and JUULing (5 mins) • Questions (5 mins) • Closing activity: Post-its (2 min)

Warm-up Activity	10 mins
<p>Post-its:</p> <p>Before class starts, write the following on the board: “On a scale of 1-10, how harmful is vaping or JUULing, where one is not at all harmful and 10 is very harmful?”.</p> <p>Give each student a post-it note and ask them to put their name on the post-it and place it under a number.</p> <p>Ask for one volunteer from the most common response to briefly explain their rationale. Tell students that you will revisit this chart at the end of class.</p> <p>True/False:</p> <p>Explain to the students that they’re going to play a True/False game. You are going to read a statement and if they think it’s true, they should go to the right-hand side of the room. If they think the statement is false they should go to the left-hand side of the room.</p> <p>Display the first slide and cue the statements one at a time while you read them to the class. After students determine their answers. Explain the correct answer (in the slide notes).</p>	

Intro to E-cigarettes	<i>10 mins</i>
Share slides 1-12 with the students.	
Smoking vs Vaping Video	<i>10 mins</i>
<p>While students watch, have them consider: Imagine a classmate wants you to try vaping and tell them why you choose not to.</p> <p>Once you finish the video, students discuss responses with their partner and ask for one or two answers to share with the whole class.</p>	
“What’s in e-liquid?” Activity	<i>15 mins</i>
Distribute one side of a chemical cards to students. Students then must find the person who matches the image of a product that contains that chemical to the chemical description. Stand in a circle and each pair tells the class their chemical and what it does to your body. Ask whole class, why do you think they put so many chemicals into e-cigarettes?	
Finish Presentation on Vaping/JUULing	<i>5 mins</i>
Share slides 13-21 with the students.	
Questions	<i>5 mins</i>
Answer any questions the students may have and feel free to follow up with the Physician Advocacy Network if you aren’t sure the answer!	
Closing Activity	<i>5 mins</i>
Give students the opportunity to move their post-it if they have changed their opinion since the beginning of class. Ask students what they learned during class that was surprising or new about e-cigarettes.	

Appendix D – smokeSCREEN Videogame Content Sample



Appendix E – The “Real Cost” Campaign Sample Poster



therealcost • Follow

therealcost When we asked you about vaping metals, it was a trick question you couldn't get wrong. #TheRealCost #Vape #Vaping #ECig #ECigs

Load more comments

mikewattsfbgm @juicy_j_315



therealcost @jasprosesprite we hear you! Check this: Did you know that most vapes contain nicotine, the same addictive chemical found in cigarettes? Add that to the fact that vaping can



13,480 views

JANUARY 2

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