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Describing Interventional Approaches to the E-cigarette/Juuling/ Vaping Epidemic in Eastern Kentucky High Schools: A Case Study

Taylor Miller
tayloremiller@uky.edu

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Taylor Miller, Student

Dr. Sarah Wackerbarth, Committee Chair

Dr. Sarah Wackerbarth, Director of Graduate Studies

**Describing Interventional Approaches to the E-cigarette/Juuling/Vaping Epidemic in
Eastern Kentucky High Schools: A Case Study**

Capstone Paper Project

A paper submitted in the partial fulfillment
of the requirements for the degree of
Master of Public Health
in the
University of Kentucky College of Public Health

by

Taylor Miller

Mt. Washington, Kentucky

Final Examination

Lexington, Kentucky

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Capstone Committee

Sarah Wackerbarth, PhD (Chair)

Paula Arnett, PhD (Committee Member)

Jennifer Knight, PhD (Committee Member)

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Abstract

Problem: Over the past few years there has been significant increase in vaping/juuling/e-cigarette use among the adolescent population. Since this is a new health issue, there are very few intervention programs for teens to receive education about these devices and support for quitting/treatment. The aim of this study was to provide insight on interventions that have already been implemented to provide direction for those seeking to design their own vape/juul/e-cigarette intervention. This was assessed by comparing approaches and lessons learned during the intervention implementation process.

Methods: The study was conducted using a case study approach. The researcher conducted interviews with three key informants including Leigh Ann Holt, Dr. Melinda Ickes, and UK I Can End the Trend Ambassadors. Key successes and barriers were compared for each program.

Results: Information obtained through interviews was assessed based on four categories: assessing the need of Eastern Kentucky high schools, obstacles/modifications, obtaining funding/resources, and successes/long-term impact. This allowed for comparisons and differences to be made between each intervention program.

Discussion: Vape/juul/e-cigarette intervention programs have the ability to prevent adolescents from starting and support them through quitting/treatment. Though continued research will most likely lead to future program modifications, Dr. Ehrie and Dr. Ickes successfully implemented their intervention program in Eastern Kentucky high schools. Their dedication to this health issue has created a path forward for others seeking to design interventions aimed at decreasing the rate of vape/juul/e-cigarette use in the Eastern Kentucky high school population.

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Introduction

In the mid-2000s alternative tobacco products were first introduced to the market, causing concern due to heightened public interest (Perikleous, 2018). E-cigarettes/juuls/vapes are electronic nicotine delivery systems (ENDS) and are noncombustible tobacco products. These products use an “e-liquid” that’s heated to produce an aerosol to be inhaled by the user (Pepper & Brewer, 2013). Nicotine, along with varying compositions of flavorings, vegetable glycerin, propylene glycol, and other ingredients are commonly found in “e-liquids”. The added flavorings have been shown to lessen the nicotine taste, which allows for increased appeal, increased nicotine delivery, and increased inhalation (Carpenter & Wayne, 2005). Sweeter flavors like candy and fruit have proven to be the most popular compared to tobacco or clove/spice (Goldenson & Kirkpatrick, 2016). These devices are generally composed of similar components and operate in a similar manner, but the design and appearance of each device can vary. E-cigarettes/juuls/vapes may be manufactured to resemble pipes, cigars, conventional cigarettes, USB flash drives, or pens. There are also larger devices such as mods or tank systems, that don’t resemble a cigarette at all (Vaporizers, 2020). Today, there are over 400 devices and 7,000 flavoring chemicals that are easily accessible through online shops and retail (Benowitz & Goniewicz, 2013).

E-cigarettes/juuls/vapes may be used as a cessation tool for established smokers that are looking to quit (Soule & Lopez, 2016) However, it has been found that these devices are most commonly used among high school students which has raised concern across the US. Certain flavored e-cigarettes/juuls/vapes are appealing to teens who otherwise may have never tried another nicotine product and may not be aware of its addictiveness (US Food, 2018). Large-scale marketing of e-cigarettes has had a widespread effect on all age groups, especially vulnerable

teens. Though high school students are not of age to purchase these devices, they can access them through online retail shops, older peers, or even family members (Schneider & Diehl, 2016).

Eastern Kentucky was selected as the focus for this project because this area is number one for lung cancer, smoking, etc. Vapes/juuls/e-cigarettes have become a very popular product in the US over the past few years. These products have become especially prevalent among adolescents. Since this is a new health issue, many researchers and health professionals are working to design intervention approaches to inform and decrease the amount of people using these products, especially teens.

Due to the health disparity in Kentucky the purpose of this capstone project was to provide insight on interventions that have already been implemented to provide direction for those seeking to design their own vape/juul/e-cigarette intervention. This project describes Dr. Michael Ehrie's and Dr. Melinda Ickes' interventional approaches to student vape/juul/e-cigarette use and documents lessons learned.

Safety Concerns

From 2011 to 2019, e-cigarette/juul/vape use has increased among high school students. While 1.5% of high school students reported e-cigarette/juul/vape use in the past 30 days in 2011, 27.5% reported past month use in 2019 (Youth & Tobacco, 2019). Marketing has created a perception that e-cigarettes/juuls/vapes are healthier and safer compared to traditional cigarettes (Perikleous & Steiropoulos, 2018). In 2012, the National Youth Tobacco survey revealed that nearly one-third of adolescents in the US believed e-cigarettes/juuls/vapes were less harmful than standard cigarettes (Ambrose & Rostron, 2014). However, the aerosol from e-cigarettes/juuls/vapes is known to contain the same harmful toxins (usually at a reduced

percentage) as standard cigarettes, including lead, cadmium, formaldehyde, diacetyl, and acrylonitrile (Goniewicz & Knysak, 2014). Since there is no single e-cigarette/juul/vape device, components of the product itself, the battery (which controls the temperature), and chemicals in flavored liquid pods vary depending on the manufacturer. These various factors make it difficult for researchers to establish what an e-cigarette/juul/vape user is inhaling. E-cigarettes do not burn tobacco like traditional cigarettes, so most people consider the devices to be less harmful. But just because there is less harm doesn't mean there is no harm. The aerosol produced by e-cigarettes/juuls/vapes is a mixture of ultra-fine particles and aerosolized particles that consist of tiny pieces of metal and chemicals. This mixture is then taken in through the lungs causing potentially harmful health outcomes. E-cigarettes/juuls/vapes are not fully regulated by the FDA, even though the devices became available about a decade ago. This means that there are presently no standards regarding the safety of the ingredients or the chemical components of an e-cigarette/juul/vape. (Darville & Borger, 2019).

Long-Term Health Effects

E-cigarettes/juuls/vapes are fairly new products, so more research is still needed to determine long-term health effects of use. Though health effects are still unknown, these devices can still pose health risks to the user. Research has shown that e-cigarettes/juuls/vapes can have negative effects on the heart and irritate the lungs. There have also been recent reports of users with serious lung disease. Symptoms of this disease have included fatigue, fever, weight loss, nausea, vomiting, diarrhea, cough, trouble breathing, or chest pain. Multiple cases have been critical enough to require hospitalization (What Do We Know, 2020). As of February 2020, there have been 2,807 illnesses or deaths related to e-cigarettes/juuls/vapes across all 50 states. 68 deaths have been confirmed in 29 states (Outbreak of Lung, 2020).

Nicotine and Adolescents

Research shows that young people who vape/juul/use e-cigarettes are more likely to start using other tobacco products, which can lead to cancer and other diseases (Raven, 2019). Using both traditional cigarettes and e-cigarettes/juuls/vapes exposes you to an even higher amount of toxic chemicals and nicotine, which is very addictive (Darville & Borger, 2019). Nicotine can lead to dangerous health implications at any stage of life, but especially before the brain is developed, which occurs around age 25. Nicotine can physically alter the teenage brain.

“Adolescents don’t think they will get addicted to nicotine, but when they do want to stop, they find it’s very difficult,” says Yale neuroscientist Marina Picciotto, PhD. A key reason for this is that “the adolescent brain is more sensitive to rewards,” she explains (Raven, 2019). The mesolimbic dopamine system, or the “reward system” was developed as a positive reinforcement for behavior we need to live. It is difficult to resist because it’s so deeply rooted in the brain. When a teen inhales the aerosol from an e-cigarette/juul/vape, the nicotine hijacks the brain’s reward system because it wasn’t meant for drugs. The brain releases dopamine which helps create a ‘feel-good’ feeling for the individual. Unlike other drugs, once nicotine is broken down by the liver it leaves the body. The brain craves nicotine again once it’s gone (Raven, 2019).

Factors that Influence Teens

There are multiple factors that can influence e-cigarette/juul/vape use among adolescents, including conflict with family and peers, community structures and district laws, adolescents’ age, etc (Hawkins & Catalano, 1992). Current product design and marketing also seems to be more appealing for young people. Promotional campaigns, marketing, and retail websites use cartoons, celebrities, sexual appeal, and enhanced social activity as a way to appeal to adolescents (Grana & Ling, 2014). It is also commonly assumed that adolescents have increased

rates of impulsivity, so youth tend to adopt dangerous behaviors (Christie & Viner, 2005). Adolescents perceive e-cigarettes as easier to conceal, safer, and a healthier alternative (Choi & Fabian, 2012). Therefore, youths may be more susceptible to e-cigarette and tobacco use if they have a lower harm perception (Ambrose & Rostron, 2014). JUUL is a popular e-cigarette brand among teens. These devices can be charged in a computer and look very similar to USB drives. Juuls are smaller than most devices, so they can be hidden in the palm of the hand. They can also be difficult to detect because they don't give off much vapor or smell. Teens have been known to use Juuls or other devices in the classroom or in school restrooms (What Do We Know, 2020).

Policy and Support

On December 20, 2019, President Trump signed a \$1.4 billion spending bill into law to raise the national minimum age for purchasing tobacco products, including e-cigarettes/juuls/vapes, from 18 to 21. The FDA also released its updated rules around the sale of tobacco and vaping products to reflect the new law. It will be a violation of federal law to sell tobacco products to anyone under the legal age starting in the summer of 2020. The American Lung Association expressed that raising the age is an “easy way to protect children’s health and prevent future generations from getting hooked on nicotine (Carlisle, 2019).” The FDA and Trump administration have also placed a partial ban on mint, dessert, and fruit flavors in most refillable cartridge e-cigarettes like JUUL. Menthol and tobacco flavors were exempt from this ban, and also flavored liquid nicotine sold in open tank systems at vape shops. An FDA review process has been initiated for products that are still on the market. To try to prove that the products are not a public health risk, manufacturers are required to submit applications by May 2020 to the FDA (Goodnough & Haberman, 2020).

Teen Intervention in Kentucky

In effort to help teens stop using e-cigarettes/juuls/vapes, the Kentucky Department for Public Health has established a free service called “My Life, My Quit.” If a teen wants to quit smoking e-cigarettes or other tobacco products, they can text or call a toll-free number to be connected with a “quit coach.” Their “quit coach” will provide them up to five free, confidential sessions to develop a personalized quit plan for the teen. The “quit coach” will advise them on addressing symptoms of withdrawal, navigating social situations, and developing strategies to cope with stress. Bailey Loosemore of the Louisville Courier Journal explains how difficult it has been for teens who want to quit using e-cigarettes/juuls/vapes to find support. She writes, “As the health community plays catch-up with the electronic devices, advocates admit little research has been done on cessation for teens (Cross, 2019).”

Methods

A case study approach was used to describe Dr. Michael Ehrie’s and Dr. Melinda Ickes’ interventional approaches to reduce student vape/juul/e-cigarette in Eastern Kentucky High Schools. This research design was selected so that interviews could be used to better understand each interventional approach and the steps taken to implement these programs in Kentucky high schools. Two separate interviews were conducted with each key informant. The key informants for Dr. Ickes’ program were Dr. Melinda Ickes and two UK I Can End the Trend Student Ambassadors. Due to Dr. Michael Ehrie’s untimely death in December 2019, Leigh Ann Holt was the single key informant for Dr. Ehrie’s program.

The same 12 questions were asked to each of the interviewees to ensure consistency. These questions were created to attain a better understanding of each interviewees’ approach to

their intervention. With these answers, the researcher was able to compare each vape/juul/e-cigarette intervention program and establish key successes and barriers to each intervention. The researcher had established a connection with Dr. Ehrie and Dr. Ickes which lead to the proposed research. The interview with Dr. Ickes and the UK I Can End the Trend Student Ambassadors was conducted in person, the second interview with Leigh Ann Holt took place over Zoom due to distance from the researcher. The interview script is provided.

Both interviews were recorded to ensure that all information was received. Quantitative data were also examined from each intervention. This data includes number of high schools and student participants. The qualitative and quantitative data collected was utilized to further examine the process of each intervention program and how they compare to each other.

Results

The information in this section was obtained through interviews with Dr. Melinda Ickes and UK I Can End the Trend Student Ambassadors and Leigh Ann Holt. The responses to the interview questions were used to gain insight into the approach of each intervention program. Each intervention program was assessed based on four main categories: assessing the need of Eastern Kentucky high schools, obstacles/modifications, obtaining funding/resources, and successes/long-term impact.

Dr. Ehrie's Vaping Program

Assessing the Need of Eastern Kentucky High Schools

In December 2018, Raceland High School's principal, Tom Collins, contacted Dr Ehrie's nurse, Leigh Ann Holt, and expressed concerns that he was dealing with a vaping epidemic among his students. He stated that over half of his students were vaping. He wasn't familiar with vapes/juuls/e-cigarettes until he started catching students and confiscating the devices. At this

time, Dr. Ehrie was the lead physician for the pulmonary service line at Our Lady of Bellefonte Hospital (Russell, KY). Leigh Ann had little to no information about these devices, so she asked Dr. Ehrie to get involved. Leigh Ann began putting out flyers in the community to advertise Dr. Ehrie's program, which led to calls from high schools asking if Dr. Ehrie would present to their students.

In January 2019, Dr. Ehrie began presenting his intervention program to students at Eastern Kentucky high schools. These high schools included: Paul Blazer, Paintsville, Boyd County, Greenup County, Lawrence County, Russell, Green, Rose Hill Christian, Holy Family, East Carter, Raceland, and Magoffin. Dr. Ehrie also spoke to Eastern Kentucky elementary and middle school students. He originally did not have a name for his program, but Dr. Ehrie was so well-known and respected in the Eastern Kentucky community that his program was always referred to as "Dr. Ehrie's Vaping Program."

Dr. Ehrie's "why" for his program was if he could get through to just one kid and could get them to quit, then he had done his job. Dr. Ehrie was extremely passionate about this program. Almost every day he was going to a school and speaking to students. He would rearrange his office schedule to go to a school. He never declined a school visit, and it was always what was convenient for the school. His mission was to try to make the kids see that vapes/juuls/e-cigarettes are not like cigarettes. These devices have not been around for years, and we don't know what's going to happen if teens use them. Dr. Ehrie tried to make students realize that they are part of an experiment and that 10-15 years in the future these companies are going to be nowhere to be found. Today's youth are not going to be able to sue or get help with medical bills because these companies will be gone. Dr. Ehrie was passionate about kids and invested time in them. Dr. Ehrie spoke to over 10,000 students during the 2019 year.

Obstacles/Modifications

In terms of obstacles, when Dr Ehrie first began presenting his intervention program to Eastern Kentucky high schools, the vape/juul/e-cigarette issue was still very new. The only information Dr. Ehrie could provide to students was from a Surgeon General Report that was put out in the fall of 2018. With this information, Dr Ehrie and Leigh Ann decided to create a PowerPoint presentation to display as a visual guide for the students. The original PowerPoint presentation they produced was black and white and had no pictures. This did not go over well when presenting to students because it wasn't holding their attention. Dr. Ehrie and Leigh Ann decided to modify the Power Point presentation by making it more colorful, adding cartoon images, and images from the New England Journal of Medicine and other journal articles.

Leigh Ann also ordered rubber bracelets in each high schools' colors with the words "be smart, don't start" printed on them. The students received a bracelet after the presentation which served as a reward for paying attention. Dr. Ehrie chose "be smart, don't start" as the motto for the bracelets because they felt if the students don't start vaping/juuling/using e-cigarettes, then they don't have to worry about quitting.

A third modification made was Dr. Ehrie changing the wording during his presentation so as to not offend students, parents, or others. While Dr. Ehrie was greatly concerned for how vaping might impact decision making as well as the ability to hold a job or raise a family; he eliminated these points from his presentation so as not offend the audience he was trying to influence. While partaking in the use of these devices is very dangerous, Dr. Ehrie decided to not discuss certain things because he didn't want to take away from the main impact of his message.

Obtaining Funding/Resources

Dr. Ehrie had no source of funding for his program. At this time there were no grants available for vaping. Dr. Ehrie and Leigh Ann funded most of the program themselves which mostly consisted of travel expenses. To purchase the rubber bracelets, Leigh Ann had raised money to purchase gas cards for lung cancer patients. Excess funds were available, which she used to purchase the rubber bracelets. Dr. Ehrie also chose to present his program at no cost to the schools.

Successes/Long-term Impact

Dr. Ehrie and Leigh Ann visited a few high schools multiple times to speak to students. Leigh Ann created a Google Docs pre- and post- survey for students to take before and after Dr. Ehrie's presentation. The teachers would give the students the pre-survey before Dr. Ehrie would speak to them, and then a week later after the presentation the students would take the post-survey. On the post survey there was a question stating, "If you do not currently vape, do you plan on trying to vape in the future?" The students who did not vape stated that they would not vape in the future.

Dr. Ehrie and Leigh Ann found that it was difficult to get high school students to shift their mindset, especially at an age where teens believe they know what's best for them. During each of his presentations Dr. Ehrie would say, "You all are the guinea pigs. They are making money off of your backs. 15 years from now you all are going to end up with some health issues that we are not going to be able to help you with. I am not going to be able to do anything for you because there is nothing medically approved to help with the brain damage that this vaping is causing." While it was difficult to reach some, at the end of each presentation there was

always a handful of students that would seek support from Dr. Ehrie on how they could stop using nicotine/tobacco products.

I Can End the Trend Program

Assessing the Need of Eastern Kentucky High Schools

In 2018, there was a significant increase in e-cigarette use among youth and young adults according to Kentucky and national data. *I Can End the Trend* was created due to the spike in vape/juul/e-cigarette use and the need for engaging prevention programming. Dr. Ickes and the UK Tobacco Free Take Action Ambassadors were asked by the state to develop and incorporate a program tailored for e-cigarette prevention into their college ambassador model. This led to the development of a peer prevention and empowerment pilot program called *I Can End the Trend*.

In February 2019, Dr. Ickes and the I Can End the Trend Ambassadors began presenting the pilot program in two Kentucky high schools. Since then they have reached over 5,000 Kentucky youth. Schools have the option of selecting one 50-minute presentation, or they can choose a longer programming opportunity where Ambassadors will present on three different days to go more in depth with this issue. High school students were the initial target population, but Dr. Ickes and the Ambassadors soon realized they needed to reach elementary and middle school students as well in order for this to be an effective prevention program. Schools visited could not be shared at the time, but the image below shows a map of Kentucky highlighting their reach. Dr. Ickes stated that there are more than 5 million youth today that use e-cigarettes; and 1 in 3 Kentucky high school students report current e-cigarette use, which reinforces the need to reach younger populations to have an impact. Vape/juul/e-cigarette companies try to manipulate these vulnerable groups by changing the perceived social norm, their marketing strategies, and knowing that there's limited education currently in this area.

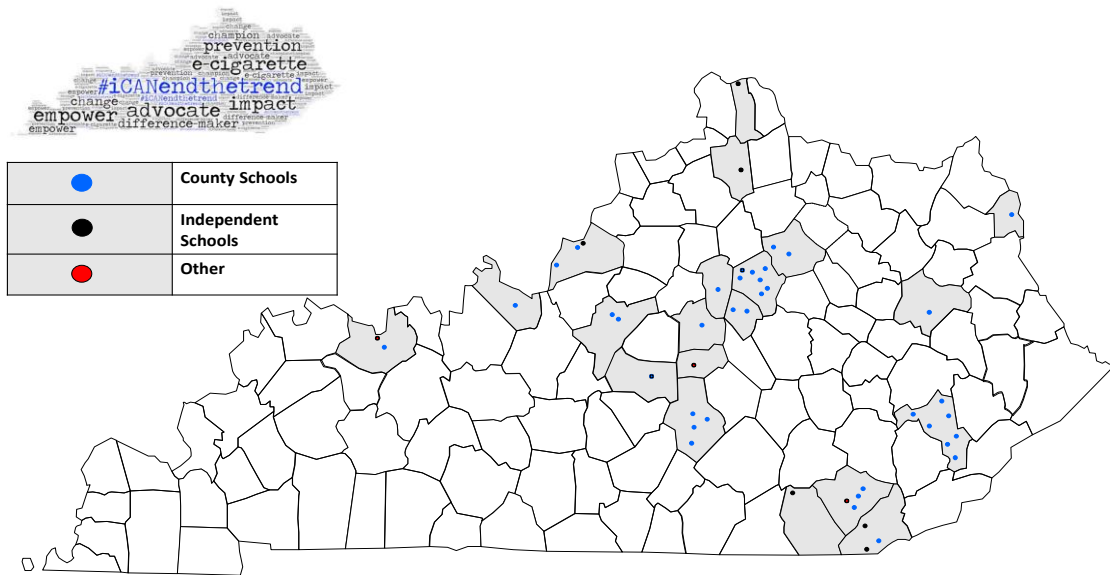


Image from: Dr. Ickes and UK *I Can End the Trend* Ambassadors

Obstacles/Modifications

Dr. Ickes and the *I Can End the Trend* Ambassadors are continuously learning as they present their program with various audiences and age groups. The image below shows the National Health Education Standards and the Kentucky Health Standards which aligns with the program’s curriculum. Dr Ickes and the Ambassadors adapt the content of their program based on policy implications, the ever-changing product landscape, emerging research, as well as other factors. They appeal to students through testimonials from someone their age who has struggled with vapes/juuls/e-cigarettes, facts/research/sources so students are able to make their own decisions, and providing ways to take action and do something about this issue. Interactive activities like, Kahoot, are continuously being added to resonate with various age groups during the program presentation. They have also developed presentations specifically for athletes, school personnel, community workers, healthcare professionals, etc. as it’s not just youth that

lack education in this area. Dr. Ickes and the Ambassadors also have more opportunities to engage youth through after school programming, and larger youth advocacy trainings to develop advocacy skills.












 NATIONAL HEALTH EDUCATION STANDARD ALIGNMENT	
NATIONAL HEALTH EDUCATION STANDARD	#ICANENDTHETREND PROGRAM ALIGNMENT
 NHES 1: Functional Health Information	 Contents of e-cigarettes, short-term consequences, effects of nicotine
 NHES 2: Analyzing Influences	 Industry manipulation/ consequences of nicotine dependence discussion
 NHES 3: Accessing Valid Health Information	 Resource sharing (quit resources, credible websites/ sources)
 NHES 5: Decision Making	 Refusal skill scenarios
 NHES 8: Advocacy	 Reconstructing advertising, social media messages

Image from: Dr. Ickes and UK *I Can End the Trend* Ambassadors

Obtaining Funding/Resources

I Can End the Trend is funded through the Kentucky Tobacco Prevention and Cessation Program. This is a sub-award as part of a larger contract the UK College of Nursing has with the state of Kentucky. In order to obtain this funding Dr. Ickes and the ambassadors submitted a prospectus with objectives that they must follow during their programming. All programming efforts align with the CDC Best Practices/Priority Areas. The resources for Ambassadors' salary, professional materials, funding for travel, and other expenses are all provided through the Kentucky Tobacco and Cessation Program. There is also no cost to the schools.

In terms of resources, in order to continue with the program's peer approach, college facilitators are critical to the success of the program. Relationships with community partners have also been an invaluable part of the program's continued success.

Successes/Long-term Impact

Before the day of the presentation, a baseline Qualtrics survey is provided to the students a week in advance to help Dr. Ickes and the Ambassadors get a general idea of what the students already know about vapes/juuls/e-cigarettes. A feedback survey is then given to the students immediately following the presentation. Four weeks after the initial presentation, students are given a post-survey as a check-up since the presentation. Through process evaluation, 70-99% of participants reported program satisfaction including: they learned something new about e-cigarettes, the program is beneficial for people their age, the program is helpful in empowering them to do something about e-cigarette use in their school/with friends. One student made a comment about program enjoyment stating, "I enjoyed that it felt like a conversation between peer leaders and students; this allowed me to be honest." Another student said, "I loved the activities included within the presentation!" Students have also contacted Dr. Ickes via social

media and/or emailing wanting to be part of the *I Can End the Trend* and/or asking how they can make a difference.

In terms of long-term impact, even with just one lesson you can empower youth to have conversations with friends/family members, seek additional information, etc. Dr. Ickes and the Ambassadors prefer to have more time with students/schools than just one lesson. It allows for additional interactive skill building activities, open dialogue, and rapport. However, something the team always discusses is making the most of each opportunity. Dr. Ickes expressed, “If we are in the classroom one time, or six times, it’s key to impact students by leaving the classroom with students feeling empowered, and leaving them with an action item...giving them the resources to answer the question what can we do now?” For those who are already using these devices it may take longer to see behavior change. Support for youth is critical at this time, which is why Dr. Ickes and the Ambassadors provide students with tobacco treatment/quitting resources during each presentation.

Summary

The following table provides a summary of the two programs.

	Dr. Ehrie’s Vaping Program	<i>I Can End the Trend</i> Program
Assessing the Need of Eastern Kentucky High Schools	Contact from local high schools, flyers to advertise program, adult to teen approach	Asked to build on to college model by the state due to national and Kentucky data, peer to peer approach
Obstacles/Modifications	Modified presentation, purchased bracelets, changed words and phrases used during presentation	Learning how to appeal to their audience, implementing activities based on audience, adapting and modifying

		curriculum to constant changes
Obtaining Funding/Resources	Funded on own, used money raised to purchase bracelets	Funded through the Kentucky Tobacco Prevention and Cessation Program
Successes/Long-term Impact	High chance of students not vaping in future, support from Dr. Ehrie	High satisfaction from program, giving students support and resources

Discussion

Each of these intervention programs had their own individual approach and process, but both shared the same purpose of educating high school students in Eastern Kentucky about vapes/juuls/e-cigarettes. Assessing the approach of each intervention program allows for comparisons and suggestions to be made in the future. This will create a path forward for others seeking to design interventions aimed at decreasing the rate of vape/juul/e-cigarette use in the Eastern Kentucky high school population. Each intervention program was assessed based on four main categories: assessing the need of Eastern Kentucky high schools, obstacles/modifications, obtaining funding/resources, and successes/long-term impact.

Assessing need in Eastern Kentucky County high schools was where each of these intervention programs began. Dr. Ehrie’s Vaping Program began when a local high school principal reached out to Dr. Ehrie’s nurse, Leigh Ann, with concerns about his students vaping. Leigh Ann got Dr. Ehrie involved and they developed a program based on Dr. Ehrie’s research and the Surgeon General Report. Leigh Ann put out flyers in the community to promote Dr.

Ehrie's program. Dr. Ehrie was well known in the Eastern Kentucky community and with the increase in vape/juul/e-cigarette use among high school students, it was not difficult to get schools in the area to respond. *I Can End the Trend* began when Dr. Ickes and the UK Tobacco Free Take Action Ambassadors were asked by the state to develop and incorporate a program tailored for e-cigarette prevention into their college ambassador model. The UK I Can End the Trend program was created due to a spike in vape/juul/e-cigarette use and the need for engaging prevention programming in Eastern Kentucky schools.

Both programs faced a few obstacles they had to modify. Dr. Ehrie and Leigh Ann began Dr. Ehrie's program with a black and white presentation with no pictures. They soon learned this would not hold the attention of students. Leigh Ann made some modifications by adding color, cartoon pictures, and pictures from various journal articles. They also purchased rubber bracelets because they felt students would pay more attention to the presentation if they were given a reward after. Lastly, Dr. Ehrie had to modify his wording and phrases so as to not offend students, parents, etc. Dr. Ickes and the *I Can End the Trend* Ambassadors had to learn how to connect and appeal to their audience/age groups.

Dr. Ehrie and Dr. Ickes had different methods of funding their intervention program. Dr. Ehrie and Leigh Ann chose to fund Dr. Ehrie's program themselves as they were unable to find a grant for vaping at the time. Travel expenses, programming materials, and rubber bracelets were all paid for by Dr. Ehrie, Leigh Ann, and some extra funds raised for cancer patients. Dr. Ickes and the *I Can End the Trend* Ambassadors funded their program through Kentucky Tobacco Prevention and Cessation Program. In order to obtain funding, Dr. Ickes and the ambassadors submitted a prospectus with objectives that they must follow during their programming. The Ambassadors' salary, professional materials, funding for travel, etc. is all provided through this

grant. College facilitators and community partners have played a critical role in the continued success of *I Can End the Trend*. They also had to adapt and modify their curriculum to constant changes with this issue.

Dr. Ehrie and Dr. Ickes both experienced success with their program. On the post survey for Dr. Ehrie's program there was a question stating, "If you do not currently vape, do you plan on trying to vape in the future?" The students who did not vape stated that they would not vape in the future. Also, while it was difficult to reach some, at the end of each presentation there was always a handful of students that would seek support from Dr. Ehrie on how they could stop using nicotine/tobacco products. This indicates that an impact, even if was a small one, was made in these schools. Through process evaluation, 70-99% of participants reported program satisfaction with *I Can End the Trend* including: they learned something new about e-cigarettes, the program is beneficial for people their age, the program is helpful in empowering them to do something about e-cigarette use in their school/with friends. Students included comments on the survey indicating their enjoyment with the program. Many have also reached out to Dr. Ickes about wanting to get involved with the program and asking how they can make a difference.

Limitations

A limitation of this study was that it was based on the experiences of only two vape/juul/e-cigarette intervention programs. These were the only intervention programs in Eastern Kentucky that the researcher was connected to. If time allowed, more vape/juul/e-cigarette intervention programs could have been sought out and interviewed. This could've provided more program comparisons and lessons learned for future intervention programs. A common limitation in most interview studies, the results of this project were restricted by the

interview participants' willingness to provide insights and ability to recall information. A structured interview script was utilized to lessen this issue.

Conclusion

The purpose of this capstone was to provide insight on vape/juul/e-cigarette interventions that have already been implemented. The goal was to provide examples and recommendations for those seeking to design their own vape/juul/e-cigarette intervention. The interviews conducted provide insight into the successes and challenges of each intervention.

Vape/juul/e-cigarette intervention programs are critical to the vape/juul/e-cigarette epidemic. This health issue is not going to improve any time soon, but with increased support, especially for youth, many can choose to quit/seek treatment before it's too late. The smoking rate in Kentucky is just now decreasing. It has taken multiple years for health professionals to get people, but especially youth to understand that tobacco products are harmful to your health. It's not glamorous or cool, it's deadly. You can't put a time on the impact these intervention programs could have on youth because vaping has become a major setback for health professionals.

Interview Questions

1. What did the design of your intervention/program look like in the beginning? What's the why behind your intervention?
2. When did the intervention/program begin?
3. Who is the target population? How many students have you reached?
4. What high schools/counties have been involved in this intervention/program?
5. When visiting the high schools, what is presented on in the program? How have students responded to the information they receive?
6. Who attends and presents the program at the high schools?
7. How is the data collected? What have your results shown so far?
8. How was funding for the intervention/program obtained? Were there specific criteria that had to be followed to obtain funding?
9. Are there any resources needed to keep the intervention/program going?

10. Is there anything you tried with your intervention/program that may not have been successful? Any lessons learned?

11. Did you modify your intervention/program along the way? If so, how?

12. How much time is needed to make a long-term impact with the students?

References:

- Ambrose BK, Rostron BL, Johnson SE, Portnoy DB, Apelberg BJ, Kaufman AR, et al. Perceptions of the relative harm of cigarettes and e-cigarettes among U.S. Youth. *Am J Prev Med* (2014) 47(2S1):S53–60.10.1016/j.amepre.2014.04.016.
- Benowitz NL, Goniewicz ML. The regulatory challenge of electronic cigarettes. *J Am Med Assoc* (2013) 310(7):685–6.10.1001/jama.2013.109501.
- Carlisle, M. (2019, December). Trump Signs Bill Raising Legal Age To Buy Tobacco to 21. Retrieved from <https://time.com/5754266/trump-tobacco-age-21/>.
- 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. (Millwood)* 2005;24:1601–1610.
- Choi K, Fabian L, Mottey N, Corbett A, Forster J. Young adults' favorable perceptions of snus, dissolvable tobacco products, and electronic cigarettes: findings from a focus group study. *Am J Public Health* (2012) 102(11):2088–93.10.2105/AJPH.2011.300525.
- Christie D, Viner R. ABC of adolescence: adolescent development. *BMJ* (2005) 330(7486):301–4.10.1136/bmj.330.7486.30.
- Cross, A. (2019, November 22). Kentucky offers free service to help teens quit vaping and smoking; Courier Journal reports on how few teen options exist. Retrieved from <http://ci.uky.edu/kentuckyhealthnews/2019/11/22/kentucky-offers-free-service-to-help-teens-quit-vaping-and-smoking-courier-journal-reports-on-how-few-teen-options-exist/>
- Darville, A., Borger, T., & Burris, J. (2019, September 6). Thinking about switching

to e-cigarettes? Read this first. Retrieved from

<https://ukhealthcare.uky.edu/blog/post/e-cigarettes-read-this>.

Goldenson N.I., Kirkpatrick M.G., Barrington-Trimis J.L., Pang R.D., McBeth J.F., Pentz M.A., Samet J.M., Leventhal A.M. Effects of sweet flavorings and nicotine on the appeal and sensory properties of e-cigarettes among young adult vapers: Application of a novel methodology. *Drug Alcohol Depend.* 2016;168:176–180.

Goniewicz ML, Knysak J, Gawron M, Kosmider L, Sobczak A, Kurek J, et al. Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. *Tobacco Control* (2014) 23(2):133–9.10.1136/tobaccocontrol-2012-050859.

Goodnough, A., Haberman, M., & Kaplan, S. (2020, January). With Partial Flavor Ban, Trump Splits the Difference on Vaping. Retrieved from <https://www.nytimes.com/2020/01/02/health/flavor-ban-e-cigarettes.html?searchResultPosition=2>

Grana RA, Ling PM. “Smoking revolution”: a content analysis of electronic cigarette retail websites. *Am J Prev Med* (2014) 46(4):395–403.10.1016/j.amepre.2013.12.010.

Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychol Bull* (1992) 112(1):64–105.10.1037/0033-2909.112.1.64.

Outbreak of Lung Injury Associated with the Use of E-Cigarette, or Vaping,

- Products. (2020, February 25). Retrieved from https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html.
- Pepper JK, Brewer NT. Electronic nicotine delivery system (electronic cigarette) awareness, use, reactions and beliefs: a systematic review. *Tob Control* (2013) 23(5):375–84.10.1136/tobaccocontrol-2013-051122.
- Perikleous, E. P., Steiropoulos, P., Paraskakis, E., Constantinidis, T. C., & Nena, E. (2018). E-Cigarette Use Among Adolescents: An Overview of the Literature and Future Perspectives. *Frontiers in Public Health*, 6.
- Raven, K. (2019, March 19). Nicotine Addiction From Vaping Is a Bigger Problem Than Teens Realize. Retrieved from <https://www.yalemedicine.org/stories/vaping-nicotine-addiction/>.
- Schneider S, Diehl K. Vaping as a catalyst for smoking? An initial model on the initiation of electronic cigarette use and the transition to tobacco smoking among adolescents. *Nicotine Tob Res* (2016) 18(5):647–53.10.1093/ntr/ntv193.
- Soule E.K., Lopez A.A., Guy M.C., Cobb C.O. Reasons for using flavored liquids among electronic cigarette users: A concept mapping study. *Drug Alcohol Depend.* 2016;166:168–176.
- US Food and Drug Administration. Statement from FDA Commissioner Scott Gottlieb, M.D., on New Enforcement Actions and a Youth Tobacco Prevention Plan to Stop Youth Use of, and Access to, JUUL and Other E-Cigarettes. US Food and Drug Administration; Silver Spring, MD, USA: 2018.
- Vaporizers, E-Cigarettes, and other ENDS. (2020, February 14). Retrieved from

<https://www.fda.gov/tobacco-products/products-ingredients-components/vaporizers-e-cigarettes-and-other-electronic-nicotine-delivery-systems-ends>.

What Do We Know About E-cigarettes? (2020, January). Retrieved from

<https://www.cancer.org/cancer/cancer-causes/tobacco-and-cancer/e-cigarettes.html>.

Youth and Tobacco Use. (2019, December). Retrieved from

https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm.