

**AN OVERVIEW OF THE IMPLEMENTATION AND EFFECTIVENESS OF THE CATCH MY BREATH PROGRAM
WITHIN A RURAL EASTERN NORTH CAROLINA HIGH SCHOOL**

by

Layla Ballance

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Layla Ballance

Greenville, NC

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Approved by:

Tamra Church

Department of Health Education and Promotion

College of Health and Human Performance

Background: Adolescent e-cigarette use continues to increase, with tobacco companies targeting younger populations through social media and other outlets (Jones & Salzman, 2020). Despite increased e-cigarette use, knowledge surrounding e-cigarette ingredients and their effects on health is inadequate (Morean et al., 2019; Jones & Salzman, 2020). The need for youth vaping prevention education is significant across the nation, and the CATCH My Breath program is an evidence-based program designed specifically to combat the youth vaping epidemic.

Objectives: The purpose of this study was to implement the CATCH My Breath program within a rural high school setting and evaluate the program's effectiveness through student survey data.

Methods: Optional, anonymous pre- and post- surveys were administered before and after the implementation of the CATCH My Breath program. The purpose of the surveys was to gather data regarding the program's effectiveness, as well as perceptions and opinions of the program.

Results: Respondents reported a lack of information surrounding e-cigarette components and the health implications of their use. The CATCH My Breath program was effective in educating students, decreasing positive expectations about vaping, diminishing the belief that youth vaping is common, and in reducing the susceptibility and likelihood of vaping.

Implications: The results of this study indicate the need for improved youth vaping prevention education efforts and the implementation of these programs in schools.

Keywords: Teen vaping, e-cigarettes, JUUL, CATCH My Breath, vaping epidemic, vaping prevention, education, public health

Introduction and Rationale

Vaping refers to the use of electronic cigarettes (e-cigarettes) that create an aerosol by using a battery to heat a liquid that usually contains nicotine and other additives that users inhale. Other dangerous chemicals such as formaldehyde form when nicotine liquid is heated to increased temperatures (Salloum et al., 2021). Originally, vaping products were developed to help adults quit smoking cigarettes; however, youth often start vaping e-cigarettes and transition to smoking cigarettes (Salloum et al., 2021). One study found that youth who vape are four times more likely to smoke traditional cigarettes than their peers who do not vape (Berry et al., 2019; Less et al., 2021). Advertising for e-cigarettes has targeted adolescent populations using social media ads, billboards, fun packaging, trendy flavors, and the product itself is aimed at increasing e-cigarette appeal for this young population (Jones & Salzman, 2020).

Many of the chemicals used for the flavorings in e-cigarettes are considered safe for human consumption via the gastrointestinal tract, but their effects on the respiratory system are relatively unknown (Advani et al., 2020; 2021). Chemicals in e-liquids are altered by heating and aerosolization, and these chemicals break down over time, leading to further concerns about the effects of the unknown chemicals on the lungs (Advani et al., 2020; 2021). Additionally, current studies have shown that adolescent use of e-cigarettes has resulted in cardiac and respiratory problems, impacts on brain development, and nicotine addiction (Liu et al., 2020; Jenssen & Boykan, 2019). The impact of nicotine on adolescent brain development can lead to negative mental-health related outcomes including depression and substance use disorder (Gaiha & Halpern-Felsher, 2020; Jenssen & Boykan, 2019).

Increased nicotine product usage among adolescents has been designated as a national epidemic by the United States Surgeon General (Huey & Granitto, 2020). In 2018, one out of every five high school students reported e-cigarette usage in the last 30 days (Cullen et al.,

2018). In 2021, it was reported that 11.3% of high school students, or 1.72 million, and 2.8%, or 320,000 middle school students, reported current e-cigarette use (Mirbolouk et al.,2022). JUUL is the most common e-cigarette brand in the U.S., yet one study demonstrated that 39% of adolescents did not consider JUULs to be e-cigarettes at all (Morean et al., 2019; Jones & Salzman, 2020). This highlights a disparity surrounding e-cigarette awareness and a lack of education about these products among adolescents.

According to the JUUL company, each JUUL pod releases a similar amount of nicotine as a pack of 20 cigarettes (Jackler & Ramamurthi, 2019). JUUL delivers nicotine 1.3 - 2.7 times faster than other e-cigarette products leaving its users more susceptible to nicotine dependence (Goniewicz et al., 2019; Jackler & Ramamurthi, 2019; Kelder et al., 2020). The higher dose and faster delivery of nicotine can further contribute to increased nicotine dependence among users, particularly adolescents.

In 2019, it was found that 35.5% of high school students in North Carolina used electronic vapor products on at least one day within the past 30 days, while the national rate was 32.7% (Centers for Disease Control and Prevention [CDC], 2019). North Carolina has become the first state in the U.S. to reach a settlement with JUUL regarding the company's role in popularizing e-cigarettes among younger populations (Wells, 2021). The company is required to pay 40 million dollars and make drastic changes involving the way products are marketed, such as using models who are above the age of 21 (Wells, 2021). The North Carolina Health Education Essential Standards include "understanding the health risks associated with alcohol, tobacco, and other drug use" yet many of the tobacco educational programs utilized in schools do not specifically address vaping (NCDPI, 2019, p. 5). The North Carolina Department of Health and Human Services (NCDHHS) suggests implementing a curriculum, such as the CATCH My Breath prevention program, for middle and high school students (NCDHHS, 2021). Of the

thousands of middle and high schools in North Carolina, 56 schools in North Carolina have implemented the CATCH My Breath program (CATCH My Breath [CMB], n.d.).

The CATCH My Breath program is the only evidence-based youth nicotine vaping prevention program for grades 5-12 that has been proven to significantly reduce students' likelihood of vaping (CMB, n.d.). This peer-reviewed and evidence-based program was developed by the University of Texas Health Science Center at Houston School of Public Health (CMB, n.d.). CMB is a free program that consists of four unique lessons that are approximately 35 minutes each that include PowerPoint presentations, both small and large group discussions, analysis of mass media, personal goal setting, and social and emotional learning (CMB, n.d.). This program intends to educate students and enable them to make informed decisions regarding the use of e-cigarette devices including JUUL devices (CMB, n.d.). The program activities are designed to influence the social and psychological factors that contribute to youth e-cigarette use by disrupting the social norms of youth that most teenagers smoke e-cigarettes, developing skills to resist peer pressure and advertising promoting e-cigarette use, understanding how advertising works to undermine credible health information, and creating favorable non-smoking attitudes and beliefs about e-cigarettes (CMB, n.d.).

The program meets National and State Health Education Standards including Common Core Standards and Collaborative for Academic, Social, and Emotional Learning (CASEL) Standards (CMB, n.d.). CATCH My Breath is designed “to be easy for teachers to implement, fit into existing class schedules, and serve either as a stand-alone program or as individual modules that can be inserted into an existing tobacco prevention program” (Kelder et al., 2020, p. 222). Data shows that “7 out of 8 students say that they are less likely to use e-cigarettes after completing this program” (CMB, n.d., p. 1). There could potentially be a significant decline in

adolescent e-cigarette usage if this program were implemented in every middle and high school across the U.S.

The purpose of this study was to evaluate the effectiveness of the CATCH My Breath program through its implementation within a rural Eastern North Carolina High School. Two optional, pre-and-post anonymous surveys were administered through the CATCH program, in which quantitative data was generated. These surveys measured students' knowledge, attitudes, and experiences with e-cigarettes including JUUL, along with their feedback on the CATCH My Breath program (CMB, n.d.). This data was used to better understand this program's effectiveness in a rural high school classroom.

Methodology

This research study (IRB #22-000141) received approval from the University Medical Center Institutional Review Board and the CATCH My Breath program was implemented during the Spring of 2022 at a rural high school in Eastern North Carolina during the participants' physical education class period. The program was separated into four sessions with sessions one and two occurring on the first day of the program, and sessions three and four occurring on the second day of the program. Participants with signed consent forms had the option to take a confidential pre-survey before the beginning of the program, and a total of 56 pre-surveys were collected. These same participants had the option to take a post-survey after completion of the program, and a total of 33 post-surveys were collected. Data from these confidential surveys was analyzed using frequency tables from SPSS (Statistical Package for Social Sciences) software.

Survey Design

The pre- and post-surveys used in this study were from the CATCH My Breath program resources. The pre-survey contained forty questions, and the post-survey contained the same questions as the pre-survey with an additional nine questions regarding the respondent's opinions

of the program and its implementation. The purpose of the surveys was to gather data regarding the usage of e-cigarettes and nicotine, student perceptions and opinions of e-cigarettes, knowledge of the components, ingredients, and health implications of using e-cigarette devices, and advertising tactics used by the tobacco and e-cigarette industries. Additionally, the post-survey assessed how effective respondents felt the program was, whether they would share information they learned with others, if they felt confident in the skills they learned through the program, if they enjoyed the program, and if they felt other middle and high schoolers should go through the CATCH My Breath program.

Sample Demographics

A total of 89 surveys were conducted, with 56 occurring before the implementation of the CATCH My Breath program and 33 surveys after the program's completion. The age of the respondents ranged from 14 to 18 years of age, with a majority being 15 years old and approximately 34% of respondents. The population of this study included high school students with 55% being freshmen, 13% sophomores, 5% juniors, and 27% seniors. Of the respondents, 32 reported being female (57%) while 23 reported being male (41%). Out of the respondents, 59% identified as White, 16% as Black or African American, 2% as American Indian or Alaskan Native, with 14% identified as being of more than one race, and 9% of respondents chose not to answer. Out of the respondents, 20% identified as being Hispanic or Latino/a, while 79% did not identify as Hispanic or Latino/a.

Results

The results were analyzed according to the CATCH My Breath Student Evaluation Codebook. The pre- and post-surveys included 13 questions that assessed changes in knowledge regarding e-cigarettes. Approximately 45% of respondents in the pre-survey reported they have vaped before, even one or two puffs, and 23% have vaped in the past 30 days. JUUL was the

most popular device used for vaping with about 9% of respondents reporting this as the device they used to vape. Roughly 30% of respondents reported that the vape they used contained nicotine and 13% reported that they did not know if the device contained nicotine.

The average knowledge score increased following the CATCH My Breath intervention, even with less respondents completing the post-survey than the pre-survey. Most respondents in the pre-survey were unsure of what the components of e-cigarettes were with 61% of respondents reported they “do not know” if e-cigarette vapor contains mostly water and 6% said that it did. After the CATCH My Breath program, approximately 89% of respondents in the post-survey answered correctly that e-cigarette vapor does not contain mostly water. The overall average knowledge score of the pre-survey was 0.41 and the score of the post-survey was 0.51. To evaluate differences in outcome expectations following the CATCH program, students were asked to rate their level of agreement with the following statements: “I would enjoy vaping,” “vaping would help me to deal with problems or stress,” “vaping will help me make new friends,” “vaping would make me wake up and feel energized.” From pre- to post-implementation, there was a 42.5% change in outcome expectations with students experiencing more negative expectations from e-cigarette use in the post-survey.

To measure perceived norms, students rated their level of agreement with the statements: most kids my age vape and most kids in high school vape. In the pre-survey, 100% of respondents agreed or strongly agreed that most kids in high school vape and 95% agreed that most kids their age vape. Following the program’s implementation, there was an approximately 50% decrease in perceived norms with students recognizing that less kids their age and in high school vape than they previously believed. Susceptibility for e-cigarette use was measured using the questions: “do you think you will vape in the next year,” “are you curious about what it would be like to vape,” and “if one of your best friends offered you a vape, would you try it?” If

students answered anything other than “definitely not” on one or more of the questions, they were considered susceptible. Following the CATCH intervention, the susceptibility for e-cigarette use decreased by 50% according to survey data.

In the post-survey, 96% of respondents reported that the CATCH My Breath program increased what they knew about e-cigarette use, 92% agreed that they are less likely to vape after participating in the program, and approximately 92% reported if they were offered a vape, they felt confident in using a refusal skill they learned from the program. Of the respondents, 86% agreed that they understand e-cigarette advertising better because of this program, and 62% agreed that they have discussed information they learned through this program with their friends or family, while 96% agreed that they thought all middle and high school kids should go through the CATCH My Breath program.

Discussion

Overall, this study suggests that teenagers are making uninformed decisions regarding e-cigarettes. Based on the survey respondents, e-cigarette users are unaware of the presence of nicotine within these devices and the health impacts of using them. Adolescents believe most students in high school and kids their age vape, and that it is popular and socially acceptable. According to the CATCH My Breath program, approximately 88% of high schoolers choose not to use e-cigarettes (CMB, n.d.). The misconception surrounding the popularity of e-cigarettes use is common due to social media.

Analysis of the pre- and post-survey results suggests that students could benefit from programs like the CATCH My Breath program. Students could learn more about e-cigarettes and increase their knowledge and understanding of their health impacts. The CATCH My Breath program was interactive and engaging for students and was one in which most respondents reported enjoying participating. Respondents felt they were less likely to vape after participating

in the program, indicating students who took part felt that this program was effective for vaping prevention. The program also gave students the opportunity to practice refusing a vape if offered, and most respondents felt confident in doing so. Equipping students with the resources and confidence they need to overcome peer pressure and say no to something they do not want to do is a critical life skill that can benefit students in many ways.

Limitations

The CATCH My Breath program was implemented over two days rather than the recommended four days, which may have impacted the program's efficacy. The data collected from the optional pre-and post-surveys was self-reported and opinionated and therefore the reliability of this data is controversial. Respondents may have felt uncomfortable answering truthfully or misunderstood the phrasing of some questions, yet still responded, possibly influencing the survey data. Not all respondents who took the pre-survey completed the post-survey. Due to the confidential and anonymous nature of the surveys, the data could not be individually analyzed. These factors may have skewed the data and impacted the results.

Implications

The results of this study highlight the similarities in respondent survey feedback and data collected at the national level. Other research has emphasized gaps in knowledge among adolescents who use e-cigarettes which is consistent with the results of this study. Recognizing and understanding common misconceptions adolescents have regarding e-cigarettes, as well as their ease of access in purchasing them will help create more effective interventions to address the vaping epidemic. Policymakers within local schools and those at the state and national level can utilize this data to better shape interventions surrounding the needs of students at the high-school level. The results of this study indicate the need for raising awareness of the ingredients and impacts of e-cigarette usage and the clearing of misconceptions surrounding their use. This

study contributes to building the evidence of effectiveness of the CATCH My Breath program, and demonstrates the potential of this program in effectively combating the teen vaping epidemic. More research into the similarities in attitudes and perceptions surrounding e-cigarette use along with the extent of knowledge regarding their components and effects should continue to determine a correlation.

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Table 1 Sociodemographic characteristics of pre-survey respondents (N=56)

Sociodemographic Characteristics	Category	n	%
Gender	Male	23	41.1%
	Female	32	57.1%
Age	14	11	19.6%
	15	19	33.9%
	16	9	16.1%
	17	7	12.5%
	18	8	14.3%
Race	White	33	58.9% %
	Black or African American	9	16.1% %
	American Indian or Alaska Native	1	1.8% %
	More than one race	8	14.3%
Ethnicity	Hispanic or Latino/a	11	19.6%
	Not Hispanic or Latino/a	44	78.6%
Class level	Freshmen	31	55.4%
	Sophomore	7	12.5%
	Junior	3	5.4%
	Senior	15	26.8%

Table 2 E-cigarette knowledge score, outcome expectations, perceived norms, and susceptibility

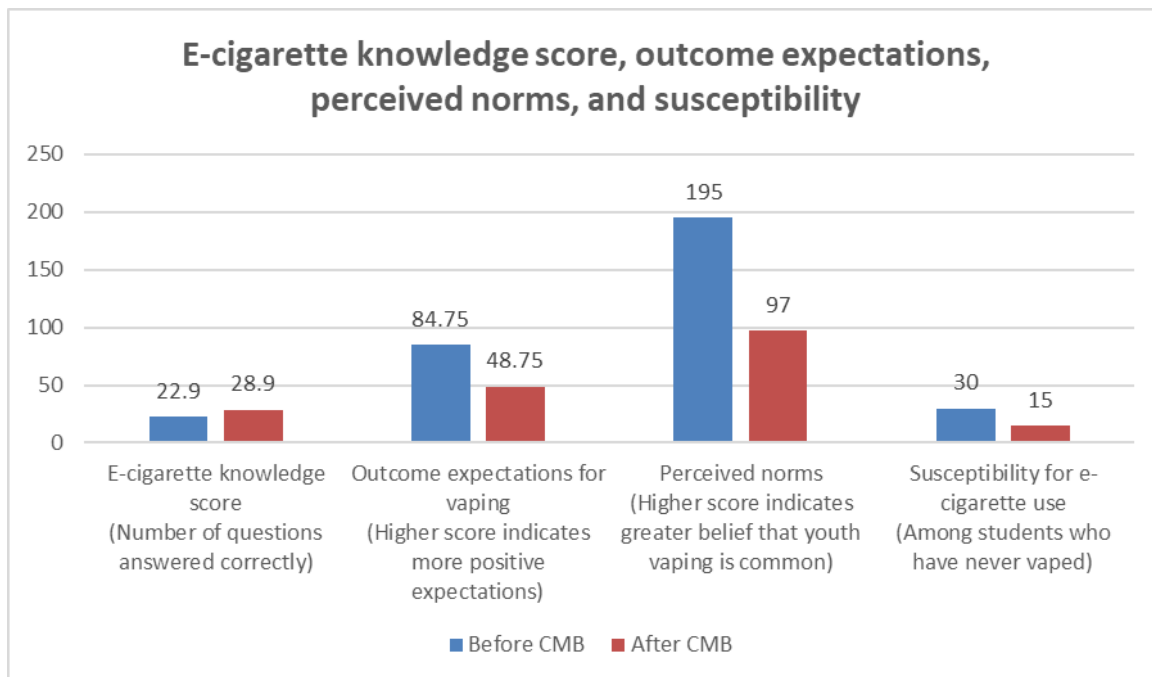


Table 3 Post-survey program evaluation results (N=33)

Theme	Response Category	Frequency (n)	Percent (%)
The CATCH My Breath program increased what I know about e-cigarette use.	Strongly disagree	1	3.8%
	Disagree	0	0%
	Agree	10	38.5%
	Strongly agree	15	57.7%
I discussed information I learned from CATCH My Breath with friends or family.	Strongly disagree	3	11.5%
	Disagree	7	26.9%
	Agree	12	46.2%
	Strongly agree	4	15.4%
If I am offered a vape, I feel confident in using a refusal skill from the program.	Strongly disagree	0	0%
	Disagree	2	8.0%
	Agree	12	48.0%
	Strongly agree	11	44.0%
I learned a lot about e-cigarettes from the CATCH My Breath program.	Strongly disagree	0	0%
	Disagree	1	3.8%
	Agree	13	50.0%
	Strongly agree	12	46.2%
I enjoyed being part of the CATCH My Breath program.	Strongly disagree	0	0%
	Disagree	1	3.8%
	Agree	16	61.5%
	Strongly agree	9	34.6%
I am less likely to vape now that I have participated in the CATCH My Breath program.	Strongly disagree	0	0%
	Disagree	2	7.7%
	Agree	12	46.2%
	Strongly agree	12	46.2%
The CATCH My Breath program would be effective in getting kids to not vape.	Strongly disagree	0	0%
	Disagree	6	23.1%
	Agree	11	42.3%
	Strongly agree	9	34.6%
I understand e-cigarette advertising better because of the CATCH My Breath program.	Strongly disagree	0	0%
	Disagree	3	11.5%
	Agree	13	50.0%
	Strongly agree	10	38.5%
I think all middle and high school kids should go through the CATCH My Breath program.	Strongly disagree	0	0%
	Disagree	1	3.8%
	Agree	12	46.2%
	Strongly agree	13	50.0%