

Vaping Use and Environmental Review Among Adolescents: Analy High School

Analysis Report

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Abstract

Objectives: This report analyzes the prevalence, influences, and environmental awareness related to electronic cigarette (EC), also known as vaping pens, use among Analy High School students in Sebastopol, West Sonoma County, California. ECs are a cause for concern as they contain nicotine, flavorings, and other chemicals that are heated into an aerosol and inhaled into the lungs, leading to addiction and developmental and physical harm to adolescents. The lack of awareness of the harm that vaping use has on adolescents is equally matched to the harm that ECs have on the environment.

Methods: A total of 73 responses were collected from the estimated 1,450 student body population at Analy High School, with a 5% response rate. This survey was conducted to understand the vaping use of high school students at Analy High School in West Sonoma County and awareness of the environmental implications of ECs waste. The survey accepted various responses to the questions allowing a qualitative approach, which can be found in figure 4.

Results: The results show that 30% of the students have used a vaping product containing nicotine, marijuana, or other substance, and 15% of those have used a vaping product within the last 30 days.

Conclusion: There is a need for further awareness and action to limit the use of ECs and prevent the harm they cause to adolescents and the environment. This report is useful to provide future engagement strategies to gain a greater insight into adolescent vape users at Analy High School.

Keywords: electronic cigarettes, tobacco, vaping, vape, adolescents, environment, physical, influences, addiction, dependency

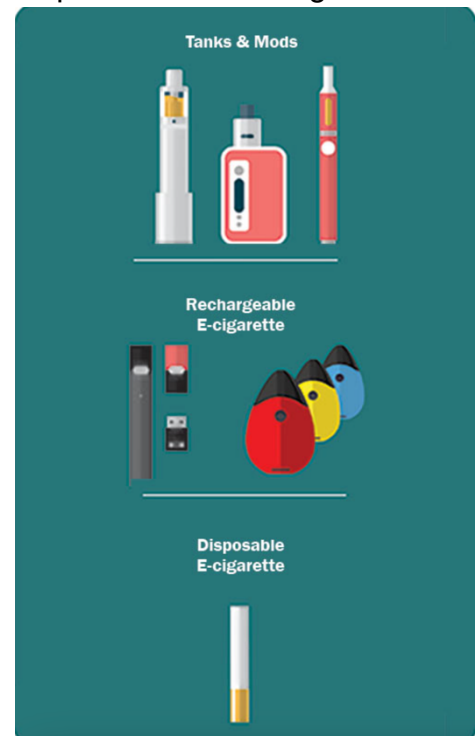
Introduction

The use of tobacco products is the leading cause of preventable disease, disability, and death in the United States (CDC, 2022). The prevalence of e-cigarette

(ECs) use among adolescents in the United States has increased in recent years, with eight in 10 students reporting use (CDC, 2022). This increase is cause for concern as ECs also known as vaping pens or vapes, often contain nicotine, flavorings, and other chemicals that are heated into an aerosol and inhaled into the lungs (CDC, 2022). ECs are a recent innovation to help the cessation of cigarette use, however, they expose users to similar risks of tobacco cigarettes (Prasedya et al, 2020). Additionally, ECs are highly addictive and can cause developmental and physical harm to adolescents (CDC, 2022). Research shows the impact of adolescent brain development

through vaping use of nicotine and cannabis negatively affects sleep, concentration, memory, and mental health (Jacobus & Tapert, 2014). Furthermore, reduced prefrontal cortex activation and long-term structural and chemical changes in the brain can cause negative implications for impulse and emotional control while impacting respiratory functions (England et al, 2015). Consequently, research suggests that ECs do not replace conventional cigarettes, rather contributing as a gateway to smoking initiation since adolescent smokers are more likely to become dependent on nicotine (England et al, 2015). This creates a larger public health concern for adolescents as their brain and body maturation is ongoing into their mid-twenties, causing damage from an early age.

The lack of awareness of the harm that vaping use has on adolescents is equally matched to the harm that ECs have on the environment. Tobacco is the number one littered item on the planet which ends up in waterways or the environment (WHO, 2022). Additionally, there are 7,000 chemicals in any given tobacco product, 80 of which cause cancer (Cancer Council, n.d.) High school students are often unaware of the dangerous impact that vaping pens can have, leading to frequent recreational use



among friend groups often unacquainted with ECs disposal requirements. In Sonoma County, vape pens account for 70 tons of annual waste in landfills introducing a 3-fold issue of battery explosion through lithium-ion batteries, single-use plastics (disposable), and acute hazardous wastes that are thrown away with some liquid nicotine remaining (Zero Waste Sonoma, 2022). The increased use of vape pens and the lack of knowledge on proper disposal leads to added concern. Subsequently, ECs have been linked to structural fires and wildfires, as well as accidental injuries from batteries exploding on users' faces and bodies (Zero Waste Sonoma, 2022; Seitz & Kabir, 2018). Additional environmental factors must be considered with ECs, including secondhand aerosol, often mislabeled as vapor, which contains high concentrations of ultrafine particles that are higher than conventional cigarettes. Exposure to EC aerosol in a secondhand capacity may worsen respiratory ailments, like asthma, and in more serious circumstances constrict arteries triggering a heart attack (ANRF, 2023).

The physical, mental, and environmental impacts that ECs have are now being addressed within communities and states at the policy level. For instance, tobacco-related regulations in California, especially Sonoma County, have begun addressing the youth EC epidemic with the Stop Tobacco Access to Kids Enforcement (STAKE) Act that prohibits sales to people under 21 (CDPH, 2022). Additional laws like the Tobacco Retail License (TRL) Policy and HSC Section 104599.5 tighten compliance for businesses to limit the number of tobacco products sold. In 2020 Gravenstein Health Action Coalition proposed to Sebastopol City Council a comprehensive TRL ordinance (SB 793) restricting the sale of flavored tobacco and ECs, limiting tobacco retailer density, restricting product pricing, setting minimum pack requirements, and banning tobacco sales in pharmacies (Public Health Law Center, 2022). Moreover, SB 793 ensures that any California retailer or employee may not sell or offer to sell most flavored tobacco products (Public Health Law Center, 2022). The efforts made by local communities and the state to protect its citizens against the harms of ECs and other tobacco products have improved West Sonoma County, including the City of Sebastopol, as a leader in tobacco control. Despite this, schools like Analy High School are still experiencing a new wave of adolescent users.

Through reflection on the socio-ecological model, we can better understand the various influences that may lead teenagers to use ECs. The influences behind adolescent vaping use include complex socio-ecological factors such as individual (health and personal traits), interpersonal (social circle), organizational (school and social institutions), community (social and cultural), and public policy (regulations and laws) (Han & Son, 2022). The socio-ecological factors that will be explored include mental health, peer influence, parental influence, social media, environmental awareness, knowledge of physical influence, and self-awareness.

This report presents findings from the 2023 vaping assessment of Analy High School in Sebastopol, West Sonoma County, California on behalf of Gravenstein Health Action Coalition (GHAC) exploring prevalence, influences, and environmental awareness among high school students (grades 9-12).

Methodology

Overview

This assessment was created to understand the vaping use of high school students at Analy High School in West Sonoma County and awareness of the environmental implications of ECs waste. The methods to conduct this survey began with an on-campus assessment of Analy High School followed by a pilot study. The pilot survey was produced in collaboration with Tobacco Free Sonoma County Community Coalition (TFSCCC) and Impact Sonoma on important vaping questions to engage Sebastopol high school students. The pilot survey was conducted in person with Analy High School's leadership class, resulting in 25 responses and an informational review with students on their views of vaping. After the pilot survey was administered, modifications were made to the survey in which a final version was created. Minor adjustments were made to the pilot survey to include questions based on demographics, cannabis use, media advertisements, and environmental impact.

Participants

A total of 73 responses were collected from the estimated 1,450 student body population at Analy High School, with a 5% response rate for the main survey. The responses included 7 freshmen, 1 sophomore, 22 juniors, and 43 seniors. The diverse

population of respondents identified as 2% Native Hawaiian or other Pacific Islander, 5% Asian or Asian American, 6% American Indian or Alaskan Native, 8% Black or African American, 9% multiple ethnicities, 24% Hispanic or Latinx, and 65% White or Caucasian. In accordance with APA ethical principles, informed consent was given at the beginning of the survey and the participants were assured of their anonymity. Additionally, the participants were given permission to withdraw or skip a question at any time with the researcher's contact information for questions or follow-up information. In response to this consent, 11 students skipped a question, decreasing the overall number of respondents to 62 responses collected.

Materials

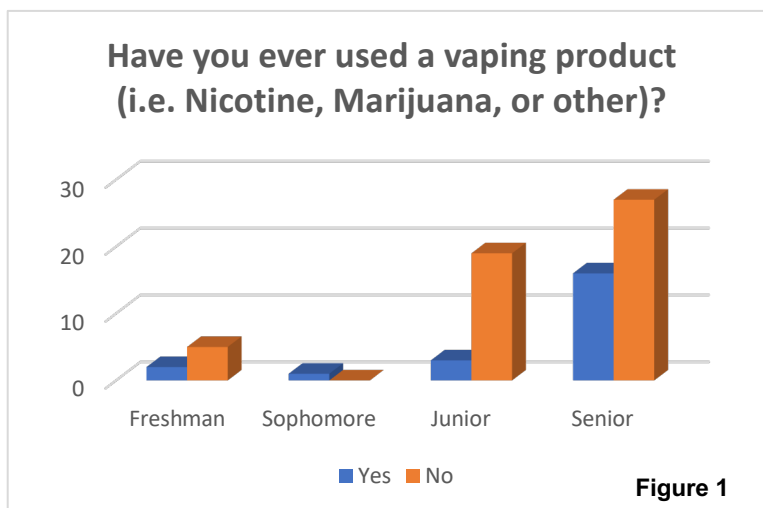
The final survey was administered through an online portal that was accessible through a website link and QR code for convenient scanning. The survey accepted various responses to the questions allowing a qualitative approach, which can be found in figure 4. The survey includes 14 questions to understand each participant's demographics, including grade level and ethnic background, history and frequency of vaping use, side effects of vaping, peer influence, home influence, knowledge of vaping harms, social media influence, and where students obtain vaping pens.

Procedure

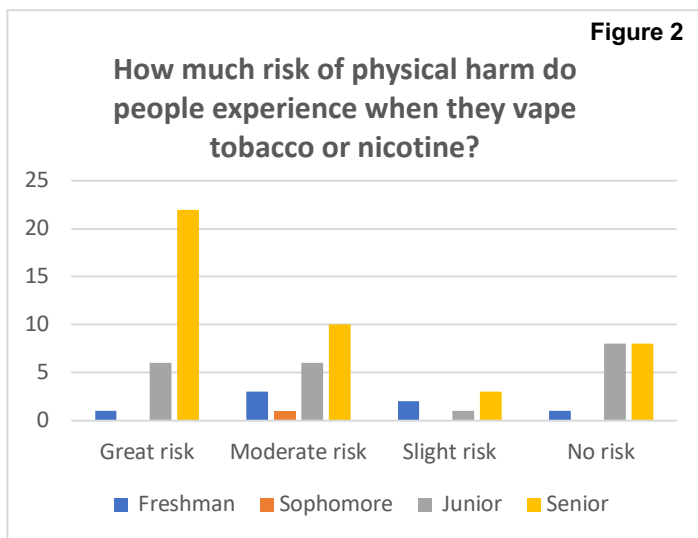
The survey was collected by teaching staff at Analy High School and administered through an email sent by the researcher which included information on the importance of vaping reduction and regulations surrounding ECs. Upon student interaction with the survey, students were immediately prompted to read the informed consent and begin filling out questions. At the end of the survey, students were again provided with the researcher's contact information for additional questions or concerns. Analy students were informed of complete confidentiality and anonymity to decrease the possibility of bias in responses.

Results

The results show that 30% of students have used a vaping product containing nicotine, marijuana, or other substance (see Figure 1), and 15% of those have used a vaping product within the last 30 days. Of these, 4% used vaping products 20-30 days in a month, and 5% reported cravings or difficulty reducing when unable to vape. In



response to social influence, 20% reported that most of their friends smoke or vape nicotine, 19% reported some of their friends smoke or vape, 15% reported very few, 21% reported that none of their friends do, and 23% reported that they did not know. In a similar question, students responded if their friends smoke or vape cannabis, 20% answered yes most of their friends do, 21% some of their friends do, 5% very few of



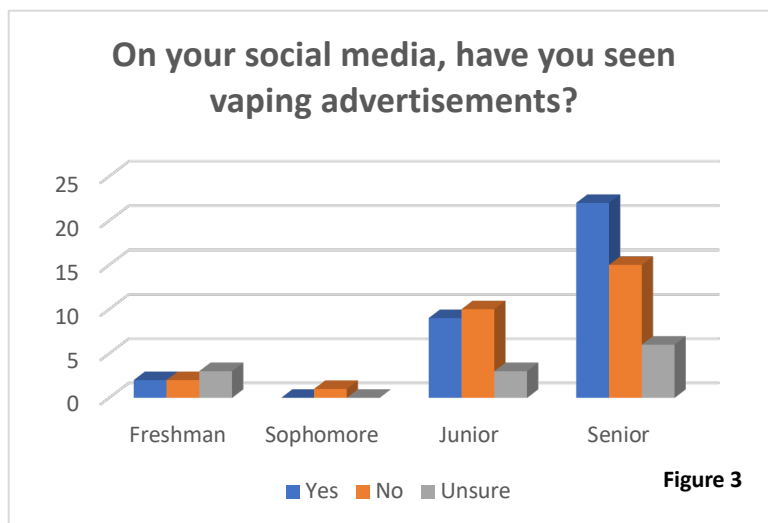
their friends, 15% none, and 36% did not know. Additionally, when asked if the people the student lives with smoke or vape, 20% responded yes, 69% responded no, and 9% did not know.

The survey asked how much risk of physical harm people experience when they vape tobacco or nicotine (see Figure 2), 40%

responded great risk, 27% moderate risk, 8% slight risk, and 23% reported no risk. For those that knew of risks, they were asked if they were concerned or influenced by their decision to vape or smoke, 29% responded strongly concerned, 11% were somewhat concerned, 22% were neutral, 25% were not concerned, and a personal response stating, "I am concerned but self-medicating weed has helped my anxiety, insomnia,

and eating disorder”. In an additional self-write in question as to where students obtain vaping pens, the most common response was “plugs” or “friend” with 62 responses. In social media, vaping advertisements were seen by 45% of students, 32% reported not seeing any advertisements, and 16% were

unsure if they had seen any (see Figure 3). Finally, students were asked if they knew about the impact that vaping has on the environment, 54% responded yes, 32% did not, and 12% responded that they want to know more.



Discussion

The purpose of this assessment was to understand the vaping prevalence, influences, and environmental awareness among Analy High School students. Despite various EC regulations in place for West Sonoma County, 30% of the respondents reported having used a vaping product containing nicotine, marijuana, or other substance, with only 5% of the student population surveyed. There was a similar response to the question if friends of participants use vape pens for nicotine at 19% yes, and friends who do not at 21%, and for cannabis vape use 20% responded yes, and 15% responded that their friends do not. Additionally, 20% of respondents' parents or the person they live with also smoke. These answers allow for insight into the student's interpersonal influences and the likelihood of use and access to ECs. Furthermore, with 40% of students responding there is a great risk for the use of vaping pens, and 23% reported no risk shows the wide spectrum of knowledge (or lack of) toward the actual perceived risk of vaping, challenging the students' perceived physical control and need for behavior changes. With more information available on the topic of vaping, students might be able to learn and understand the harms of vaping.

The influences of vaping behavior are identified further with the impact of social media which can be a useful tool if employed correctly, since 45% of respondents recall seeing ads for vaping. This information can be useful for an organizational actionable pursuit to influence adolescents who use vaping pens. Surprisingly, 54% of students knew the impact that vaping had on the environment, 32% were not aware, and the remaining 12% were interested in learning more. This highlights an opportunity in which students can learn more and collectively become conscious of the harms of vaping.

The challenge with regulations in place to prohibit under 21-year-olds from purchasing ECs is that most students still have access despite policies in place, with respondents indicating they receive access to vape pens through a third-party individual who is most likely of age. The most common answer as to where students obtained vaping pens was from a third-party person who had access. Comparatively, in the pilot study conducted on the Analy campus with 25 students, 52% of the leadership class reported having used a vaping product at least once, indicating a consistent prevalence of student vaping use. Furthermore, in an on-campus assessment, an appointed supervisor who catches students vaping at school reported that students “on track for college” were least likely to use, lowering the chance of being taken to the office and searched. This perspective is challenged since the leadership class shared a high prevalence of vaping use. Perhaps not each student who vapes, does so at school nevertheless are still negatively impacted by the physical and mental implications. However, the survey is limited by the small sample size therefore not allowing for generalizability of the Analy High School population, producing insightful findings on engagement and survey collection.

The success of this survey was impacted by the virtual access compared to in-person responses. For example, the in-person pilot study with student engagement allowed for the entire leadership class to allocate time to take the survey without any questions being skipped. In contrast, the virtual launch negatively altered engagement with responses trickling in over the course of two weeks and skipped questions. The small sample population of 73 respondents was reduced to 62 respondents with 11 students skipping questions, further limiting the results.

Conclusion

The major conclusions drawn from this report find that active engagement to receive and provide adequate EC use intervention must be delivered in person. The results indicate poor response rates in part due to the online outreach method compared to the pilot study which occurred in person. Furthermore, research shows that common individual influence on ECs use includes demographics, mental health, perception of ECs, and curiosity, while interpersonal influences include peer use and parental use (Han & Son, 2022). To lean on interpersonal and personal influences for a positive intervention, adolescents using vape pens at Analy High School must be encouraged through community building and physical informational materials. The researcher of this assessment recommends in-person engagement for Analy High School's vaping prevention and intervention tools for improved outreach. Additionally, future researchers should engage Analy student population in person for assessments and surveys to ensure higher response rates. Although this report may not be used to inform policy, it is useful for future engagement strategies to gain a greater impact and insight into adolescent EC users.

Figure 4
Analy High School Survey

- 1. What grade are you in?**
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
- 2. What is your race or ethnicity? (Mark all that apply)**
 - a. Black or African American
 - b. Hispanic or Latinx
 - c. Asian or Asian American
 - d. American Indian or Alaska Native
 - e. Native Hawaiian or other Pacific Islander
 - f. White or Caucasian
 - g. Multiple ethnicities
- 3. Have you ever used a vaping product (i.e. Nicotine, Marijuana, or other)?**
 - a. Yes
 - b. No
- 4. In the past 30 days have you used a vaping product?**
 - a. Yes
 - b. No
- 5. If you answered yes, how frequently have you used a vaping product in the past 30 days?**
 - a. 0 days
 - b. 1 day
 - c. 2 days
 - d. 3-9 days
 - e. 10-19 days
 - f. 20-30 days
- 6. Have you had any cravings or difficulty reducing use when you were not able to vape?**
 - a. Yes
 - b. No
 - c. I don't vape
- 7. Where do you obtain vaping pens?**
 - a. Write in option.
- 8. Do your friends smoke or vape nicotine?**
 - a. Yes, most of my friends do
 - b. Some of my friends do
 - c. Very few of my friends do
 - d. None of my friends do
 - e. I don't know
- 9. Do your friends smoke or vape cannabis?**
 - a. Yes, most of my friends do
 - b. Some of my friends do
 - c. Very few of my friends do

- d. None of my friends do
- e. I don't know

10. Do the people you live with smoke or vape?

- a. Yes
- b. No
- c. I don't know

11. How much risk of physical harm do people experience when they vape tobacco or nicotine?

- a. Great risk
- b. Moderate risk
- c. Slight risk
- d. No risk

12. If you know there are risks, does this concern you or influence your decision to vape or smoke?

- a. Strongly concerned
- b. Somewhat concerned
- c. Neutral
- d. Not concerned
- e. Other (please specify)

13. On your social media, have you seen vaping advertisements?

- a. Yes
- b. No
- c. Unsure

14. Do you know about the impact that vaping has on the environment?

- a. Yes
- b. No
- c. I want to know more

Resources

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