2014 – 2024 Vaping Trends and Research

Substance Abuse Prevention and Treatment Block Grant White Paper Series

Image: Vaping word smoke cloud, L. Diaz Jr.

Produced by Coop Consulting, Inc.
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Mission: New Mexico's Statewide Epidemiological and Outcomes Workgroup (SEOW) reviews and disseminates data about substance abuse and misuse and their consequences. It also identifies best practice information about evidence-based prevention strategies, policies and practices that can lead to successful outcomes for New Mexicans. The purpose of this two-fold work is to inform communities so that they can better target behaviors and risk factors that can be positively impacted by the implementation of well-chosen, evidence-based prevention approaches that are appropriate for the population. The important work of the SEOW is directed by the Office of Substance Abuse Prevention (Behavioral Health Services Division, Human Services Department) and supported by federal funding from the Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration.

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Introduction

Vaping devices were introduced into the United States nearly 20 years ago, and the results of its introduction have been beyond concern (Consumer Advocates for Smoke-free Alternatives Association (CASAA), 2024). In 2018, the reported use of e-cigarettes was 3.2% of U.S. adults (Dai & Leventhal, 2019). While vaping was increasing in popularity, world events and prevention efforts have changed the trajectory of that increase. In this white paper, we explore vaping by describing the device and its history, how it impacts a person's wellbeing, the influence of social media on vaping, youth vaping, and the latest in interventions. This white paper is written for anyone unfamiliar with vaping and anyone looking to learn of the latest research findings on vaping.

Some studies use the term e-cigarettes, electronic nicotine delivery systems (ENDS), vaping devices, or vaping. These terms will be used interchangeably in this white paper. While research on vaping devices may include cannabis, this white paper will primarily focus on vaping and nicotine. There are minor references to cannabis due to research studies that focused on all forms of vaping.

A Quick History on Vaping

While vaping devices have grown in popularity over the last two decades, their existence reaches further back. The first reference to an electronic cigarette was in a patent filed in 1927 (CASAA, 2024). The vaping device would not be successful until 2003 when a Chinese pharmacist created the first successful electronic cigarette. From this point forward, European and United States markets were introduced to the electronic smoking device in 2006. Vaping grew in popularity and controversy within the United States, Europe, Venezuela, Australia, Saudi Arabia, and other countries due to health effects, laws, and unsupported health claims (CASAA, 2024). For a complete time of historical events, visit casaa.org.

What is Vaping

Built as electronic smoking devices, vaping devices come in various shapes and forms. A study found over 460 brands (Zhu, Sun, Bonnevie, Cummins, Gamst, Yin, & Lee, 2014). There are four components in vaping devices: a cartridge/pod holding the liquid solution, a heating element, a battery, and a mouthpiece (National Institute on Drug Abuse (NIDA), 2024). Most liquid solutions contain some level of nicotine. Some studies suggest that vaping may be less harmful than cigarettes, although nicotine is addictive and chemicals in the liquid solutions exposes lungs to various chemicals (Sleiman, Logue, Montesinos, Russell, Litter, Gundel & Destaillats, 2016; NIDA, 2023). Carcinogens, toxic metal nanoparticles, nickel, chromium, and cadium are some of the chemicals that may be present in vaping liquid solutions, which can lead to lung illnesses and deaths (Hess, Olmedo, Navas-Acien, Goessler, Cohen, & Rule, 2016). Puffing from the devices vaporizes the liquid, resulting in a vapor. The result is referred to as vaping.

Vaping and the Brain

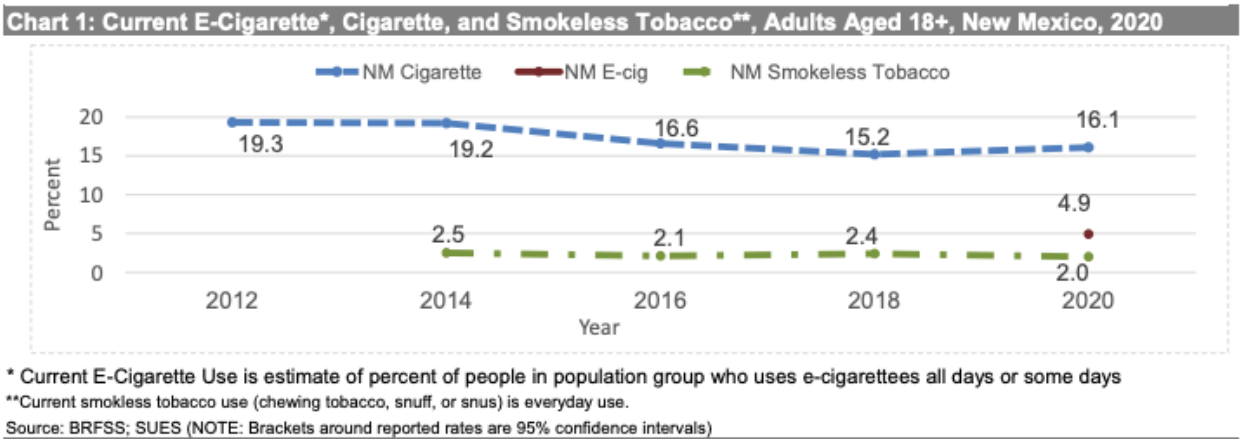
Many drugs impact a person's reward circuit, increasing dopamine (NIDA, 2018). This is part of the brain's reward system, providing pleasure and encouraging repetitive behaviors. Over time, a person develops tolerance, seeking more to achieve the initial high. In the short-term, a person may experience less pleasure from activities they enjoyed. This causes the brain to undergo changes with learning, judgment, decision-making, stress, memory, and behavior (NIDA, 2018). This is also true for vaping.

Vaping impacts the brain due to the use of nicotine in the liquid solutions (NIDA, 2024). When nicotine enters the bloodstream through the lungs, it "stimulates the adrenal glands to release the hormone epinephrine (adrenaline)" (para. 7). This leads to the increase in blood pressure, breathing, and heart rate. Additionally, it triggers an increase in dopamine levels. Nicotine affects brain development related to attention and learning, including mood disorders and impulse control problems (U.S. Department of Health and Human Services, 2016). In 2015, one study found that 99% of vaping products contained nicotine (Marynak, Gammon, Rogers, Coats, Singh, & King, 2017). This makes vaping a serious health concern.

New Mexico Data Trends

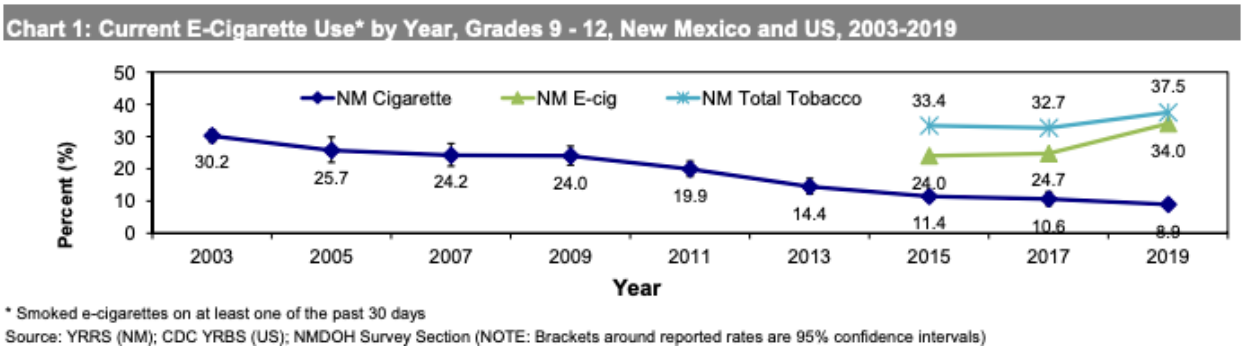
While the state of New Mexico has experienced a decrease in cigarette use, there has been an increase in e-cigarette/vaping use. Using the 2022 New Mexico Substance Use Epidemiology Profile, we can observe data trends for adults and high school students. In Chart 1, we see data for adults over the age of 18. There is a steady decline for cigarettes and smokeless tobacco. We do see a slight increase in 2020 for cigarette use, which may be attributed to the COVID-19 pandemic. In 2020, there is the first data point for e-cigarettes, 4.9%. This is surprisingly low compared to the use of cigarettes, 16.1%. In Chart 2, we see data for high school students from 2003 to 2019. There is a steep decline from 2017 (10.6%) to 2019 (8.9%) in the use of cigarettes. With this decline comes an increase in the use of e-cigarettes from 24% in 2015 to 34% in 2019. In Table 1, we see data for grades six through eight within the New Mexico Youth Risk and Resiliency Survey (2018). With an increase in the use of e-cigarettes in 2019, it is followed by a steep decline by 2021. The use of cigarettes decreases from 2015 to 2021. In Tables 2 and 3, we see tobacco use data by the Centers for Disease Control (CDC; 2023). Overall, the use of e-cigarettes for middle school students is at 4.6% and 10% for high school students. The use of cigarettes is at 1.1% for middle school students and 1.9% for high school students. The data demonstrates a higher use of e-cigarettes in New Mexico compared to the CDC data. The use of cigarettes is declining both in New Mexico and across the U.S. Keep this data in mind; the following sections provide insight into what may be contributing to the decline.

Chart 1.



Source: New Mexico Substance Use Epidemiology Profile 2022

Chart 2.



Source: New Mexico Substance Use Epidemiology Profile 2022

Table 1.

New Mexico Youth Risk and Resiliency Survey - Tobacco, Middle School, Grades 6-8				
	2015	**2017**	**2019**	**2021**
Ever smoked cigarettes	15.4%	12.4%	13.9%	9.7%
Any current tobacco use	14.1%	12.9%	17.3%	12.1%
Ever used an electronic vapor product or e-cig	25.4%	21.6%	28.9%	19.3%

Source: New Mexico Youth Risk and Resiliency Survey; Green, Peñaloza, & FitGerald (2018)

Table 2.

Current Tobacco Product Use* Among Middle School Students in 2023[7]

Tobacco Product	Overall	Girls	Boys
Any tobacco product†	6.6%	7.5%	5.7%
Electronic cigarettes	4.6%	5.6%	3.5%
Cigarettes	1.1%	1.1%	—
Cigars	1.1%	1.2%	1.0%
Smokeless tobacco	0.7%	0.6%	—
Hookah	1.0%	—	0.8%
Nicotine Pouches	—	—	—
Heated tobacco products	0.8%	0.8%	—
Pipe tobacco	0.4%	—	—

Source: Centers for Disease Control and Prevention (2023)

Table 3.

Current Tobacco Product Use* Among High School Students in 2023[7]

Tobacco Product	Overall	Girls	Boys
Any tobacco product†	12.6%	14.1%	11.2%
Electronic cigarettes	10.0%	12.2%	8.0%
Cigarettes	1.9%	1.5%	2.3%
Cigars	1.8%	1.4%	2.3%
Smokeless tobacco	1.5%	—	2.1%
Hookah	1.1%	1.4%	0.9%
Nicotine Pouches	1.7%	—	2.6%
Heated tobacco products	1.0%	0.7%	1.4%
Pipe tobacco	0.6%	0.5%	0.7%

Notes:
*"Current use" is determined by respondents indicating that they have used a tobacco product on at least 1 day during the past 30 days.

†In 2023, any tobacco product includes e-cigarettes, cigarettes, cigars, smokeless tobacco (composite), pipe tobacco, bidis (small brown cigarettes wrapped in a leaf), hookahs, heated tobacco products, nicotine pouches, and other oral nicotine products.

Source: Centers for Disease Control and Prevention (2023)

The 2019 Rise of Lung Injuries

In the late summer of 2019, the United States Food & Drug Administration (FDA) issued a warning due to the increase in lung injuries related to the use of Tetrahydrocannabinol (THC)-containing vaping products and vaping products obtained in the streets. There were over 1000 reports of lung injuries, with some resulting in death. The CDC would name the lung injury outbreak e-cigarette, or vaping, product use-associated lung injury, EVALI for short (2021). The CDC reported on February 18, 2020, that there was a total of 2,806 EVALI cases and deaths. Vitamin E acetate and THC was linked to the outbreak.
Lung biopsies conducted displayed signs of acute lung injury, organizing pneumonia, diffuse alveolar damage, fibroblast plugs, hyaline membranes, and other features (Mukhopadhyay, Mehrad, Dammert, Arrossi, Sarda, & Brenner, 2020; Smith, Gotway, Crotty Alexander, & Hariri, 2020). Individuals used vapes containing THC, nicotine vapes, or both. While infections were not found in EVALI cases, there was considerable damage identified in the lungs.

Social Media and Vaping

A research study focused on Internet searches using keywords related to vaping and lung injuries during the 2019 outbreak. It was identified that many searches conducted during the time of the outbreak were related to quitting vaping and were higher than usual after July 25, 2019, with a peak occurring on September 8, and significantly declined by November 2019 (Kalkhoran, Chang, & Rigotti, 2020). On Twitter, people spread news on the consequences and impacts of vaping, while Reddit users created discourse and support for those seeking to quit vaping (Wu, Kasson, Singh, Ren, Kaiser, Huang, & Cavazos-Rehg, 2022). The EVALI outbreak was significant in creating discourse and concern among the online communities.

Recent news on social media focused on a key component of lithium-ion batteries: cobalt. The Democratic Republic of the Congo (DR Congo) is a primary source for the mining of cobalt, which is found in smart phones, electric vehicles, and many e-cigarettes (Chibelushi, 2023; Norton, 2023). A decade-long conflict has displaced 6.9 million people, with armed groups fighting for gold, cobalt, and other resources (Chibelushi,2023; Katumwa, 2023). While the humanitarian crisis in the DR Congo is concerning, it has caused a ‘quit vaping’ trend on TikTok to protest the issues (Chibelushi, 2023; Norton, 2023). This situation demonstrates an interest in ethical consumerism and the power of social influences online.

Social media can have a strong impact on youth. Using Instagram posts for their study, a group of researchers utilized images of influencers promoting vaping to young adults. It was identified that influencers promoting vaping were seen as “honest, trustworthy, and informed when the influencers provided a nicotine warning label and link to vaping cessation resources on their posts” (p. 6, Vogel, Unger, Vassey, & Barrington-Trimis, 2024). This helped persuade young adults to reconsider the use of vaping and reduced susceptibility to vaping. Without the warning labels and cessation resources, young adults were more likely to be persuaded to try vaping. The researchers noted that this approach may not be sufficient but is worth exploring. This study sheds light on the effectiveness of influencers on products and services.

A new docuseries provides a direct insight into how influencers, social media, and a noble idea led to the popularity of vaping. In October 2023, producer R.J. Cutler released the docuseries, *Big Vape: The Rise and Fall of Juul*. This four-part series follows the story of two college graduates developing a new smoking product meant to eliminate the tobacco industry. Their peers, colleagues, advocacy groups, and users of Juul share their perspectives on vaping. Juul's social media practices, flavored liquid solutions, and tech-driven approaches quickly built a popularity among the youth. The most interesting point to highlight is that the product had a goal of decreasing smoking and being used as a cessation device. What began as a noble approach to addressing cigarette smoking became the very issue it sought to address. The docuseries provides both sides of the story of Juul unfolding as a company, and its demise. It provides a great overview of how vaping impacted society through one company.

Youth and Vaping

Teens are at risk for long-term health issues due to their developing brain. There is a potential for their brain's reward system to develop an addiction to nicotine, and possibly make other drugs such as cocaine and methamphetamine appealing (U.S. Department of Health and Human Services, 2016). For a deeper dive on psychoactivation continuum associated with dopamine increase, please refer to our previous white paper on stimulant use prevention. Some of the main reasons 12th grade students begin vaping are either to experiment with vaping, attempting to replace cigarettes through vaping, or vaping for taste and entertainment (Evans-Polce, Patrick, Lanza, Miech, O'Malley, & Johnston, 2017). Youth using e-cigarettes before 9th grade were more likely to use nicotine products, including tobacco (Leventhal, Strong, Kirkpatrick, Unger, Sussman, Riggs, Stone, Khoddam, Samet, Audrain-McGovern, 2015). Studies support that vaping can lead to smoking cigarettes, suggesting that vaping nicotine may encourage adolescents to smoke cigarettes (Bold, Kong, Camenga, Simon, Cavallo, Morean, & Krishnan-Sarin, 2018; Chaffee, Watkins, & Glantz, 2018). This is alarming as it suggests youth are likely to experiment with cigarettes as a result of vaping. Adolescents using flavored e-cigarettes are more likely to continue vaping compared those using traditional e-cigarette flavors: tobacco, mint, menthol, or flavorless (Leventhal, Goldenson, Cho, Kirkpatrick, McConnell, Stone, Pang, Audrain-McGovern, Barrington-Trimis, 2019).

A study by Sokol & Feldman (2021) used the 2019 Monitoring the Future high school 12th grade data from 2009 – 2018 to review the use of e-cigarette use in this youth group. Their study concluded the following points. First, youth e-cigarette use increased rapidly with the highest prevalence in nonsmoking youth. Second, there has been a rapid decline in smoking among 12th graders since the introduction of the e-cigarette. The data was compared to smoker characteristics prior to the vaping era. Third, it was determined that these students would have taken up smoking regular cigarettes if it were not for vaping. The study did not find it to have a gateway effect to other drugs.

The 2023 Monitoring the Future survey indicated the levels of nicotine vaping are declining (NIDA, 2023). Across the country, 11.4% of 8th graders reported vaping nicotine in the past year, which remained steady from the previous survey results. In older grades, it declined. It has dropped from 20.5% to 17.6% for 10th graders, and from 27.3% to 23.2% in 12th graders. It is believed there is a correlation to the COVID-19 pandemic. The 2023 survey results were

compared to the 2020 results, which were available prior to the beginning of the pandemic. The report will be receiving an update sometime in 2024. The current survey results are preliminary. It has not been mentioned what the update will include.

Stigmatizing Imagery

When considering how media and written materials are delivered, it is important to consider the images and language used. It has been well documented that choosing person-first language can make a difference in effective public health messaging (American Medical Association, 2021; Ashford, Brown, Curtis, 2018; International Society of Addiction Journal, 2015). Terms can stigmatize individuals. Referring to someone as an "abuser" can have a very negative impact. Instead, using terms such as "a person with a substance use disorder" removes stigmas and stereotypes. This concept applies to imagery.

Using the appropriate images that remove stigmas can be difficult. One study sought to identify and provide clarity on how images can promote stigmas. Using various people in recovery as participants in their study, the researchers shared several images to best understand the types of images that invoke stigmatization (Hulsey, Zawislak, Sawyer-Morris, & Earnshaw, 2023). Images 1 and 2 below depict images that are stigmatizing. These images were triggering and brought memories of stigmatization to the participants. Images 3 and 4 depict images that are not stigmatizing. The images are neutral and did not create any triggers or negative depictions for participants in the study. This is important finding is important to consider when creating vaping messaging because images that invoke stigma cause more harm than neutral non-stigmatizing images (Hulsey et al, 2023; American Medical Association, 2021; Ashford, Brown, Curtis, 2018; International Society of Addiction Journal, 2015). When creating content for social media, incorporating non-stigmatizing images and graphics of vaping may make a difference in online engagement and providing a supportive presence.

Image 1.

From: Stigmatizing imagery for substance use disorders: a qualitative exploration

Stigmatizing treatment and patient imagery (Not Recommended to Use)

Image 2.

From: Stigmatizing imagery for substance use disorders: a qualitative exploration

Stigmatizing SUD imagery (Not Recommended to Use)

Image 3.

From: Stigmatizing imagery for substance use disorders: a qualitative exploration

Non-stigmatizing medical imagery to use

Image 4.

From: Stigmatizing imagery for substance use disorders: a qualitative exploration

Non-stigmatizing SUD imagery to use

Intervention Considerations

While there are not many new interventions and evidence-based programs (EBPs), there are concepts that provide some insight for new approaches. The literature referenced in this section highlight various perspectives as guidance, ideas, and considerations for selecting or developing EBPs.

Some of the reasons youth consider quitting vaping are related to their health, finances, social influence, and academics (Amato, Bottcher, Cha, Jacobs, Pearson, & Graham, 2021). In their study, Amato et al. found that 50% of participants shared concerns about the health impacts of vaping and how it would impact their future health. The financial burden of purchasing vapes weekly was shared by 21% of participants. Others shared how they wanted freedom from their addiction, (16%) and concerns of how their friends, parents, family viewed them, (10%). This provides insight on the potential use of strategies aimed at promoting a healthy lifestyle, making financially responsible decisions, and the importance of having positive social influences.

In Australia, it was made illegal to sell vaping products containing nicotine (Therapeutic Goods Administration (TGA), 2024). Only pharmacies can supply vapes containing nicotine with a prescription, they cannot be obtained by any other means. Australia is currently addressing a loophole that allows the sale of vaping devices and liquid that do not contain nicotine. Recent reforms aim to prohibit the sale of all vaping devices and liquids, regardless of nicotine content (Department of Health and Aged Care, 2023). Vaping products would remain available only with a prescription. The goal is to reduce access to vaping to prevent an increase in health-related concerns (Freeman, Dessaix, & Buchanan, 2024).

While some people may express interest in quitting vaping, others may not. People who began using e-cigarettes to quit cigarette use are more likely to express interest in quitting vaping (Palmer, Smith, Nahhas, Rojewski, Sandord, Carpenter & Toll, 2021). Compared to people who concurrently use vapes and cigarettes, this group is least likely to express interest in quitting. This information can help tailor approaches to harm reduction and treatment by prioritizing vape users seeking to quit instead of focusing on those unwilling to quit.

Creating or updating city ordinances to prevent indoor vaping may not have a significant impact in the community. One study sought to understand if restricting vaping indoors would deter people from vaping in social spaces. It was determined that restricting indoor vaping does not deter people from using their vaping devices (Cheng, Liu, Pesko, Levy, Fong, Cummings, 2022).

There are interventions available to help young people quit vaping such as Smoke Screen, This is Quitting, Catch My Breath, and E-Checkup To Go. These interventions are currently approved by the New Mexico Office of Substance Abuse Prevention. Alternatively, there are free resources available to the public. The National Cancer Institute has the following two resources: Smokefree Teen (teen.smokefree.gov) and SmokefreeTXT for Teens (teen.smokefree.gov/txt-teen). The Centers for Disease Control has a helpline, 1-800-QUIT-NOW, and provides additional resources at cdc.gov/quitline. The Substance Abuse and Mental Health Services Administration (SAMHSA) has a national confidential helpline, 1-800-662-4357.

Conclusion

Vaping experienced rapid growth in popularity, accompanied by concerns and risks of the public's health. While the challenges with vaping persist, understanding the various perspectives of how this substance and behavior has expanded in reach, popularity, and concerns are important to creating interventions. This is crucial for the development of effective interventions. While the use of vaping is decreasing, vaping behavior and vaping reinforces the need to continue efforts for prevention, harm reduction, and treatment. Understanding these recent changes can help us create stronger approaches for addressing electronic cigarette smoking and vaping.

CITATIONS

Amato, M. S., Bottcher, M. M., Cha, S., Jacobs, M. A., Pearson, J. L., & Graham, A. L. (2021). "It's really addictive and I'm trapped:" A qualitative analysis of the reasons for quitting vaping among treatment-seeking young people. *Addictive Behaviors*, *112*, 106599–106599. https://doi.org/10.1016/j.addbeh.2020.106599

American Medical Association. (2021). *How language makes a difference in treating substance-use disorder*. https://www.ama-assn.org/delivering-care/overdose-epidemic/how-language-makes-difference-treating-substance-use-disorder

Ashford, R. D., Brown, A. M., & Curtis, B. (2018). Substance use recovery and linguistics: The impact of word choice on explicit and implicit bias. *Drug and Alcohol Dependence*, *189*(131), 138. https://doi.org/10.1016/j.drugalcdep.2018.05.005

Bold, K. W., Kong, G., Camenga, D. R., Simon, P., Cavallo, D. A., Morean, M. E., & Krishnan-Sarin, S. (2018). Trajectories of E-Cigarette and Conventional Cigarette Use Among Youth. *Pediatrics*, *141*(1), e20171832. https://doi.org/10.1542/peds.2017-1832

Centers for Disease Control and Prevention (CDC; 2021, August 3). *Smoking and Tobacco Use; Electronic Cigarettes*. https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html

Centers for Disease Control and Prevention. (2023, November 2). *Youth and Tobacco Use*. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm#current-estimates

Chaffee, B. W., Watkins, S. L., & Glantz, S. A. (2018). Electronic Cigarette Use and Progression from Experimentation to Established Smoking. *Pediatrics*, *141*(4), e20173594. https://doi.org/10.1542/peds.2017-3594

Cheng, K.W., Liu, F., Pesko, M.F., Levy, D.T., Fong, G.T., & Cummings, K.M. (2023). Impact of vaping restrictions in public places on smoking and vaping in the United States—evidence using a difference-in-differences approach. *Addiction*. 118(1): 160-166. https://doi.org/10.1111/add.16039

Chibelushi, W. (2023, December 1). Congo cobalt: TikTokers quit vaping over mining concerns. British Broadcasting Corporation. https://www.bbc.com/news/world-africa-67569996

Consumer Advocates for Smoke-free Alternatives Association (CASAA; 2024). Historical Timeline of Vaping & Electronic Cigarettes. Retrieved from https://casaa.org/education/vaping/historical-timeline-of-electronic-cigarettes/

Cutler, R.J. (Producer). (2023). *Big Vape: The Rise and Fall of Juul* [Video]. Netflix. http://www.netflix.com

Dai, H., Leventhal, A.M. (2019). Prevalence of e-Cigarette Use Among Adults in the United States, 2014-2018. *JAMA.* 322(18):1824–1827. doi:10.1001/jama.2019.15331

Evans-Polce, R. J., Department of Health and Aged Care. (2023, May 2). *Taking action on smoking and vaping*. Australian Government. https://www.health.gov.au/ministers/the-hon-mark-butler-mp/media/taking-action-on-smoking-and-vaping

Freeman, B., Dessaix, A., & Buchanan, T. (2024). Closing loopholes in Australian vaping laws: Why Australia's proposed vaping reforms are sound public health policy. *Australian and New Zealand Journal of Public Health*, 100114–100114. https://doi.org/10.1016/j.anzjph.2023.100114

Green, D., Peñaloza, L., and FitzGerald, C. (2018). New Mexico Youth Risk and Resiliency Survey: Middle School Survey Results 2015, 2017, 2019, 2021, Valencia County. Epidemiology and Response Division, New Mexico Department of Health; School and Family Support Bureau, New Mexico Public Education Department; and University of New Mexico Prevention Research Center.

Hess, C. A., Olmedo, P., Navas-Acien, A., Goessler, W., Cohen, J. E., & Rule, A. M. (2017). E-cigarettes as a source of toxic and potentially carcinogenic metals. *Environmental research*, *152*, 221–225. https://doi.org/10.1016/j.envres.2016.09.026

Hulsey, J., Zawislak, K., Sawyer-Morris, G. & Earnshaw, V. (2023). Stigmatizing imagery for substance use disorders: a qualitative exploration. *Health Justice* **11**, 28. https://doi.org/10.1186/s40352-023-00229-6

International Society of Addiction Journal. (2015). *Statements and Guidelines Addiction Terminology*. https://www.isaje.net/addiction-terminology.html.

Katumwa, J.K. (2023). *A record 6.9 million people have been displaced in Congo's growing conflict, the U.N. says*. (2023, October 31). Public Broadcasting Station (PBS) NewsHour. https://www.pbs.org/newshour/world/a-record-6-9-million-people-have-been-displaced-in-congos-growing-conflict-the-u-n-says

Leventhal, A.M., Strong, D.R., Kirkpatrick, M.G., Unger, J.B., Sussman, S., Riggs, N.R., Stone, M.D., Khoddam, R., Samet, J.M., Audrain-McGovern, J. (2015). Association of Electronic Cigarette Use with Initiation of Combustible Tobacco Product Smoking in Early Adolescence. *JAMA.* 314(7):700–707. doi:10.1001/jama.2015.8950

Leventhal, A. M., Goldenson, N. I., Cho, J., Kirkpatrick, M. G., McConnell, R. S., Stone, M. D., Pang, R. D., Audrain-McGovern, J., & Barrington-Trimis, J. L. (2019). Flavored E-cigarette Use and Progression of Vaping in Adolescents. *Pediatrics (Evanston), 144*(5), 1-. https://doi.org/10.1542/peds.2019-0789

Marynak, K. L., Gammon, D. G., Rogers, T., Coats, E. M., Singh, T., & King, B. A. (2017). Sales of Nicotine-Containing Electronic Cigarette Products: United States, 2015. *American journal of public health, 107*(5), 702–705. https://doi.org/10.2105/AJPH.2017.303660

New Mexico Department of Health. New Mexico Substance Use Epidemiology Profile, 2022

Mukhopadhyay, S., Mehrad, M., Dammert, P., Arrossi, A. V., Sarda, R., Brenner, D. S., Maldonado, F., Choi, H., & Ghobrial, M. (2020). Lung Biopsy Findings in Severe Pulmonary Illness Associated with E-Cigarette Use: A Report of Eight Cases. *American Journal of Clinical Pathology*, *153*(1), 30–39. https://doi.org/10.1093/AJCP/AQZ182

National Institute on Drug Abuse (NIDA; 2018, June 6). Understanding Drug Use and Addiction Drug Facts. Retrieved from https://nida.nih.gov/publications/drugfacts/understanding-drug-use-addiction

NIDA. (2020, January 8). Vaping Devices (Electronic Cigarettes) Drug Facts. Retrieved from https://nida.nih.gov/publications/drugfacts/vaping-devices-electronic-cigarettes

NIDA. (2023, December 13). Reported drug use among adolescents continued to hold below pre-pandemic levels in 2023. Retrieved from https://nida.nih.gov/news-events/news-releases/2023/12/reported-drug-use-among-adolescents-continued-to-hold-below-pre-pandemic-levels-in-2023

Norton. K. (2023, December 21). Cobalt powers our lives. What is it—And why is it so controversial? Environment. Retrieved from https://www.nationalgeographic.com/environment/article/cobalt-mining-congo-batteries-electric-vehicles

Palmer, A. M., Smith, T. T., Nahhas, G. J., Rojewski, A. M., Sanford, B. T., Carpenter, M. J., & Toll, B. A. (2021). Interest in Quitting e-Cigarettes Among Adult e-Cigarette Users With and Without Cigarette Smoking History. *JAMA Network Open*, *4*(4), e214146–e214146. https://doi.org/10.1001/jamanetworkopen.2021.4146

Patrick, M. E., Lanza, S. T., Miech, R. A., O'Malley, P. M., & Johnston, L. D. (2018). Reasons for Vaping Among U.S. 12th Graders. *Journal of Adolescent Health*, *62*(4), 457–462. https://doi.org/10.1016/j.jadohealth.2017.10.009

Sleiman, M., Logue, J. M., Montesinos, V. N., Russell, M. L., Litter, M. I., Gundel, L. A., & Destaillats, H. (2016). Emissions from Electronic Cigarettes: Key Parameters Affecting the Release of Harmful Chemicals. *Environmental Science & Technology*, *50*(17), 9644–9651. https://doi.org/10.1021/acs.est.6b01741

Smith, M. L., Gotway, M. B., Crotty Alexander, L. E., & Hariri, L. P. (2021). Vaping-related lung injury. *Virchows Arch: An International Journal of Pathology*, *478*(1), 81–88. https://doi.org/10.1007/s00428-020-02943-0

Sokol, N. A., & Feldman, J. M. (2021). High School Seniors Who Used E-Cigarettes May Have Otherwise Been Cigarette Smokers: Evidence from Monitoring the Future (United States, 2009-2018). *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, *23*(11), 1958–1961. https://doi.org/10.1093/ntr/ntab102

Therapeutic Goods Administration (TGA), (2024). *Vaping hub*. Australian Government, Department of Health and Aged Care. Retrieved from https://www.tga.gov.au/products/unapproved-therapeutic-goods/vaping-hub

U.S. Department of Health and Human Services. (2016). E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General—Executive Summary. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health

United States Food & Drug Administration (FDA). (2019). Lung Injury Update: FDA Warns Public to Stop Using Tetrahydrocannabinol (THC)-Containing Vaping Products and Any Vaping Products Obtained Off the Street. Retrieved from https://www.fda.gov/safety/medical-product-safety-information/lung-injury-update-fda-warns-public-stop-using-tetrahydrocannabinol-thc-containing-vaping-products

Vogel, E. A., Unger, J. B., Vassey, J., & Barrington-Trimis, J. L. (2024). Effects of a nicotine warning label and vaping cessation resources on young adults' perceptions of pro-vaping instagram influencer posts. *Addictive Behaviors*, *149*, 107888–107888. https://doi.org/10.1016/j.addbeh.2023.107888

Wu, D., Kasson, E., Singh, A. K., Ren, Y., Kaiser, N., Huang, M., & Cavazos-Rehg, P. A. (2022). Topics and Sentiment Surrounding Vaping on Twitter and Reddit During the 2019 e-Cigarette and Vaping Use-Associated Lung Injury Outbreak: Comparative Study. *Journal of Medical Internet Research*, *24*(12), e39460–e39460. https://doi.org/10.2196/39460

Zhu, S. H., Sun, J. Y., Bonnevie, E., Cummins, S. E., Gamst, A., Yin, L., & Lee, M. (2014). Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. *Tobacco control*, *23 Suppl 3*(Suppl 3), iii3–iii9. https://doi.org/10.1136/tobaccocontrol-2014-051670