Disinformation in Targeted Health Advertisements and Posts in Social Media and Real-World Factors Related to Vaping

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Zi Zeng

Spring 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor

Sean M. Ferguson, Department of Engineering and Society

Disinformation in Targeted Health Advertisements and Posts in Social Media and Real-World Factors Related to Vaping

Introduction and Background

The popularity of social media platforms promotes the distribution of advertisements and posts more than ever before, and these may change people's behaviors and perceptions for the worse. With increasing numbers of people seeking health and medical advice online, it is important to understand the correlation between the advice and the reality. Targeted algorithms take advantage of this advertising and aim to bring users relevant information through a number of channels, but there is little to stop these containing misinformation. Among these channels, the social media is a major target. Working as a non-profit network of scientists aiming to promote scientifically supported health and medical news to the public on the internet, Health Feedback conducted research into the top hundred most popular and frequently shared health articles. This revealed a shocking result: the large majority of health news articles shared on social media platforms contain misleading or even false health information, and the social media platform, Facebook, provides 96% of those shared articles (Teoh, 2019). The top three topics among those articles were disease and disease treatment, food and nutrition, and vaccinations. Of these, the food and nutrition information had the lowest credibility score because much was published on sites that could not be relied on (Teoh, 2019). The bandwagon effect and preconceived notions are the main reasons for people believing in the targeted health news, although many of these sites cannot support their claims with any detailed information or credible origins. These fake advertisements and health posts are becoming increasingly hazardous to the public's health. People may buy unnecessary and potentially harmful supplements, or worse, practice dubious treatments (Booth, 2019).

The health impact of e-cigarettes has been a controversial topic ever since these products were first marketed. Recently, more and more scientific findings show that vaping can be a short-term health risk, but the majority of e-cigarette consumers appear not to realize this. As reported in the journal of pediatric surgery, Skertich and Sullivan concluded that, as with other traditional smoking behaviors, vaping is one of the factors that may lead to spontaneous pneumothorax. They hoped their findings would alert health professionals and motivate them to ask patients about their vaping history to enable better diagnosis and treatment of spontaneous pneumothorax (Skertich, 2019). Vaping is also a potential risk for lung injury. The epidemic of e-cigarette consumption has caused more than 1800 people to succumb to critical health conditions, and at least 37 have died. Among these 1800 people, the majority were younger than 35 years, and around 14% were younger than 18 years (Stanbrook, 2019). The potential harm of e-cigarette consumption has attracted serious concerns in society, especially when considering the safety of young adults (CBS Interactive, 2019). The University of Michigan's Monitoring the Future (MTF) program conducted a national survey on vaping, which gave the surprising result that the number of people who had consumed an e-cigarette in the previous 30-days had at least doubled among all age groups between 2017 and 2018. College students reported the greatest increase of all age groups with a significant rise from 6.1% to 15.5% (Schulenberg, 2019). Researchers Barker and Rohde conducted a study calculating the percentage of submissions to the online social community Reddit that related to vaping, and they suggested that the growth of e-cigarette use in the United States may be due to the widely spread e-cigarette

information communicated through the social media (Barker, 2019). An investigation of the correlation between vaping among college students and social media use makes possible an empirical evaluation of the impact that medical information, distributed through media platforms, can have on users.

This research paper's goals are two-fold. First, it aims to find out whether correlations exist between targeted vaping advertisements, posts on social media, college students' perceptions, and their use of e-cigarettes. It also aims to investigate and account for both the digital and real-world lives of vaping users to ensure that holistic interventions can be created to prevent ignorance and potentially harmful vaping behaviors among college students. To accomplish these goals, the paper starts by uncovering the associated risks of vaping, and then moves on to talk about social media's influence on whether vaping is treated as dangerous or normal, and social media's propagation of misleading vaping content that can introduce unexpected risks and harm. Related literature reviews are presented to help in the investigation and to establish a general understanding and prove the existence of the correlations. On this basis, the ways in which knowledge, community behaviors, and individuals develop a relationship to vaping, through both human and non-human interaction, is analyzed using actor network theory (ANT) as a framework to provide information and understanding on these matters. In this section, the associated entities and the methodologies used, such as case studies, are discussed. The conclusion summarizes information learned from scholarly journals, the framework analysis, and the case study results, and it provides several suggestions for future studies, including topics that may be worth investigating.

Literature Review

Consumers should be made aware of the potential long-term harm of vaping and try to avoid misleading marketing information (Verhaegen, 2019). Although researchers are working hard to study the potential harm of vaping, the public is at risk due to its ignorance. In 2019, an outbreak of lung disease associated with vaping forced Congress to hold an emergence hearing. During the hearing, the Center for Disease Control and Prevention warned the public not to use any of the e-cigarette products mentioned by the speakers as the long-term health effects of vaping remained unknown. One of the speakers mentioned that 127 seizures and other neurological conditions had been reported that were possibly caused by e-cigarette consumption. The hearing also addressed the fact that the government is cautious of any product, including but not limited to e-cigarettes, that has not been safety tested or undergone clinical trials before being introduced to the market (United States Congress, 2019.) These fears are not unreasonable, because, in addition to spontaneous pneumothorax, lung and neurological diseases, as Verhaegen's risk report shows, vaping can also be associated with cardiovascular risk. For people who consume conventional cigarettes, the use of e-cigarettes for a short period may reduce the cardiovascular harm, but the long-term impact of vaping on cardiovascular risk is not known. Compared to conventional cigarette smokers, e-cigarette smokers have less knowledge of the health risks related to vaping. A national online survey was conducted using a sample of 1329 current electronic nicotine delivery system users. Among the sample, 38% were current cigarette smokers, 40% were former cigarette smokers, and 22% were non-smokers (Jennie, 2019).

The participants had more knowledge about the health risks of tobacco use than those of e-cigarette use. This is not encouraging as the popularity of e-cigarettes among young people has continued to increase over the past few years. For example, the percentage of high school students who had used e-cigarette products in the last 30 days rose from 1.5% in 2011 to 20.8% in 2018 (Couzin-Frankel, 2019). This is not only happening in the United States: in 2017, 29% of Canadians aged 16-19 had consumed vaping products compared to 37% in 2018 (Grégoire, 2019).

The potential negative health impact of vaping makes studying e-cigarette advertisements and posts on social media a crucial research topic because of social media's powerful influence. Rowe and Alexander point to what may prove to be the cause of the misinterpretations and erroneous beliefs presented in social media advertisements and posts. The loss of professional journalism and the diversification of information platforms are both underlying reasons for this misinformation. The percentage of knowledgeable health and nutrition reporters has decreased in recent years due to the emergence of new information technologies and the changes taking place in the internet social environment (Rowe, 2019). Furthermore, a lack of expertise in subject matters has made things worse. New journalists lacking knowledge of healthcare join in the game and write articles that are misleading. However, Rowe (2019) argues that they are not the only people to blame: the marketing sector presses journalists to post information that has economic value. For example, social media is identified as a “direct marketing tool” by brands wishing to promote their e-cigarette products (Sawdey, 2017).

A case study was conducted to help researchers learn to identify fake health articles in the social media, in particular. In Sommariva’s study on health message, social sites were referred to as “powerful health communication platforms.” This study analyzed stories shared on social networking sites relating to the Zika virus, and categorized them into either verified health information or rumors. They discovered that rumors were three times more frequent than verified news (Sommariva et al., 2018). The purpose of this study is not to find ways to prevent fake health news from spreading on social media but rather to help health professionals take advantage of the current social platforms and learn how to use the mechanisms for spreading information used by the fake news. Sommariva (2018) points out that such knowledge will help health professionals to break down the current communication barriers that prevent the public from accessing trustworthy health information.

Returning to vaping, the specific topic of this paper, quite a few studies already exist that show the relationship between advertisements and posts containing information about vaping and students’ perceptions and behavior related to e-cigarette consumption. A social media submission study was conducted by Barker and Rohde from March 2017 until February 2018. This study collected and analyzed nearly 80,000 submissions to the online Reddit community, which contained vaping or e-cigarette as a key word. Their study suggested that discussions on vaping products and custom vaping devices may, in fact, change user attitudes about vaping and strengthen their negative health beliefs (Barker, 2019). This finding is important because it shows that health beliefs can be shaped by repeated exposure to misleading health content, where people are unaware that their beliefs are being deliberately shaped by others. Another research project arrived at a similar

conclusion: Fagan Pokhrel's research team collected cross-sectional data from college students in Hawaii, with a sample size of 470. Their results indicated that the social media are associated with college students' e-cigarette use, and that this association was not related to their interpersonal social networks (Pokerel, 2018). This result revealed the surprising fact that, in vaping, social media influence is far more powerful than interpersonal contact. In Virginia, a team of researchers obtained clicker-responses from 258 college students and arrived at a result that separated the effect of social media advertisements and posts on long-term and current e-cigarette use. They found that, for long-term e-cigarette users, there were positive and significant associations between peer posts and advertisements related to e-cigarettes on social media, but for current e-cigarette users, only peer posts via social media that related to cigarette were associated with their use (Sawdey, 2017). Since the impact of social media can be long-term in vaping, it is better that society takes this seriously now.

A similar study was conducted on Twitter, a popular social platform, but instead of using messages collected over a particular period of time, researchers Welling Colditz and his team collected Twitter data from "World Vaping Day". Taking advantage of the size limitation on Twitter messages, which is a maximum of 140 characters, they were able to conduct their research into electronic nicotine delivery systems using 5,000 tweets that contained one or more e-cigarette related key words. Of these 5,000 tweets, 23% were aimed at promoting vaping devices, 4.9% were related to tobacco use, and an even smaller number were related to health concerns (Colditz, 2019). Using this data, Colditz's team (2019) arrived at the conclusion that e-cigarettes carry more social approval than regular tobacco products, and that people who consume e-cigarettes are considered to be "cooler". This popular shared, but subjective, view is one reason why e-cigarettes are so hard to ban.

To study health-related advertisements and posts on social media, it is necessary to collect data from social media platforms, and various research teams have devised their own approaches. For example, Wang et al. describe in detail the tracking of content through communication platforms. They introduced a systematic way of investigating misinformation in the health papers circulating in the social media. This systematic approach categorizes the health articles and then uses multiple analysis methods such as data extraction, co-citation analysis, and social network analysis. They concluded that unverified health news may lead to badly thought-out social movements with negative consequences. Action therefore needs to be taken by social and technology scientists as well as by health organizations and professionals (Wang et al, 2019).

Framework and Methodology

The internet and social media have become essential parts of daily life, and they contribute to the current proliferation of health posts and advertisements targeting immense profit from audiences resulting from their striking claims rather than from fact. As an increasing number of people become aware of the potential harm of health content that cannot be validated, it is important to understand how this occurs in society and what can be done to prevent it from getting worse. To fully understand who is involved, this research paper uses actor-network theory (ANT) to analyze human and non-human actants, including the social media platform providers, the social media platforms themselves, advertisements, vaping products, vaping companies, government agencies, product companies, schools, and

families. Specific examples are studied for each actant, using methodologies such as case studies and observation of phenomena.

ANT helps us to understand the way in which regulations shape the social media experience. This has a potential impact on the propagation of misleading information and thus on college students' relationship to vaping. We see this in one of the most important entities, the social media platform providers, as their interests are focused on attracting users and increasing profit. One important reason is the lack of legal regulations that force these private sector companies to take action to reduce the number of misleading and potentially harmful health advertisements and posts on their websites. Fortunately, action has been taken to regulate their behavior. For example, in Europe, the EU Code of Practice on Disinformation has made companies such as Google, Facebook, and Twitter agree to implement voluntary regulatory standards in order to reduce the spread of misinformation (Bradima, 2019). The other reason is that social media providers largely gain their revenue from advertising. To investigate the financial reasons behind this situation, Facebook's financial reports were analyzed. In 2019, Facebook earned 69,655 million dollars in advertising, while combined, its other revenue sources contributed only 1,041 million dollars. Compared to its 55,013 million dollars in 2018, it had gained an additional 27% from advertising in 2019 (Facebook, 2019). Given this huge revenue gain, it is hard to persuade platform providers to make changes for the sake of society at the expense of their own profits.

Thankfully, some social media companies are now taking action to regulate their advertising policies, and their efforts are reflected on the social media platforms. This involves two important non-human actants in ANT: the social media platforms and the vaping ads themselves. The National Youth Tobacco Survey conducted a study on four sources that expose youth to vaping advertisements, which include the internet, retail stores, streaming services, and magazines or newspapers. They found that an estimated 11,180,000 youths are exposed to vaping product advertising through the internet, which was just less than the retail stores' estimated number of 18,670,000 (Wang, 2019). This reflects how important it is to regulate vaping advertising on the internet. Two of the giant social media platforms, Facebook and Twitter, were investigated, with a focus on their advertising policies on vaping products. Facebook advertising policy states that "Ads must not promote the sale or use of tobacco products and related paraphernalia. Advertisements must not promote electronic cigarettes, vaporizers, or any other products that simulate smoking" (Facebook, 2020). They also banned the use of language that incites people to buy tobacco or alternative products, and they banned images that promote the use of those products. Twitter took similar action, but only mentioned that they prohibit the promotion of "all cigarettes, including alternatives which imitate the act of smoking" and were less specific than Facebook (Twitter, 2020). Although it is not clear why Twitter used ambiguous terms in regulating its platform, it is possible that some vaping promoters may take advantage of the loophole. This is one of the long-standing problems in social media platforms that causes misleading vaping contents to spread like wildfire, and the promoters know only too well how to play around the rules and keep themselves free of censure.

ANT forces us to think about how vaping products are designed and marketed. A number of details are provided below on what is happening in the design, regulatory, and

marketing world as related to three of the most important entities: the vaping products themselves, the vaping companies, and government agencies and officials.

Vaping products are the non-human components that shape how humans construct their desire for vaping and determine the types of user regulation. One of the important characteristics of a vaping product is its flavor. Lei Wang and other researchers conducted a study analyzing e-cigarette flavors by investigating data from Reddit, a popular social media platform. They found that, since 2014, Reddit's posts relating to e-cigarette flavors had increased rapidly, and that among all those flavors, fruit flavors were those most discussed. Their study indicates how it is possible to use social media platforms as a tool to understand better what consumers really value in their vaping products and how product promoters take advantage of that and use the social media to trigger sales. However, all of this information can also be used to make better regulation decisions (Wang, 2015).

The vaping product companies pay for advertisements on the social media platforms. To understand better what a critical role they play in the game, a vaping products provider named JUUL was investigated. JUUL is one of the largest vaping product providers in the U.S., and a couple of facts will be presented here about their advertising. JUUL invests more on social media advertising than its traditional competitors, and it inevitably targets audiences that are mainly young adults. They have paid for campaigns on Twitter, Instagram, and YouTube, and they have even set up an entire department that works on influencer marketing so that they can target and hire top social media influencers to promote their products (Truth Initiative, 2019). To maximize their profits, e-cigarette manufacturers market heavily through social media channels. The potential impact is huge, and misleading information can be spread more quickly on social media than it is possible to imagine. This results in young adults digesting deliberately promoted vaping information from social media without the protection of an understanding of its source.

Government agencies and officials play essential roles in the network as they start to regulate the source of these advertisements and posts on social media. Local, state and federal governing bodies, as well as policymakers and legal experts, have introduced a series of methods to intercede in this area. Already the federal agency has banned some popular vaping products to keep young kids from consuming them (Associated Press, 2020). In 2019, the Food and Drug Administration and the Federal Trade Commission sent written warnings to four companies: Solace Vapor, Artist Liquids Laboratories LLC, Hype City Vapors LLC, and Humble Juice Co. LLC because their social media content promoting the sale of vaping product did not include the warning statements about nicotine that are required by law (Nedelman, 2019). The Committee on Energy and Commerce took similar action. The chairman, Frank Pallone, sent letters to Japan Tobacco International, USA Inc, JUUL Labs Inc., Fontem Ventures, and Reynolds American Inc., requesting them to provide information, including names, of all social media influencers who were paid by the companies and the social media accounts used by the companies to promote their vaping products (Press Release, 2019). This action was prompted by concern over vaping health risks, especially for the younger generation.

ANT also helps us to intervene in education, providing a potentially critical missing link among the various actors. Vaping education require effort from families and from the students themselves. The individual must be made aware that they face these health

challenges and should use extra caution when using online social media platforms. The targeted health information on social media can threaten data privacy, and people need to realize that they are responsible for verifying the credibility of news before spreading it. They must learn to be skeptical of advertisements and posts that they see, asking questions to determine their sources and to verify their reliability. The literature review conducted earlier in this research paper focused on college students' responses to interviews and questionnaires, and therefore the parents' role and actions are investigated here. An organization that has targeted the vaping problem, called Parents Against Vaping E-cigarettes (PAVE) is studied. Their activities on their own online platform reflect their understanding of what needs to be done to regulate vaping information on social media platforms, and among young adults in particular. They also communicate actively with the government, work on policy improvements, and speak to congressmen (PAVE, 2020). They realize that the public's understanding of vaping may be insufficient, and so they provide medical and clinical resources on their website and through the social media channels to educate people. Non-profit organizations like PAVE can take advantage of social media propagation to help not just the parents but the students themselves to get verified and updated information on vaping, thereby giving them a better understanding of it. The goal of these organizations is not to focus on banning vaping entirely from the social media but to bring it to the attention of society for the sake of the younger generation's health.

As mentioned in the introduction, it is important that this study accounts for both the digital and the real-world environments in which vaping users currently live. Below, some details are provided on the educational aspect of the story as it involves schools and educators and what they do in the offline world to prevent students from harming themselves by vaping. Although the U.S. has already achieved 100% smoke-free campus sites, only 485 of them prohibit vaping marijuana, and they do not mention other vaping products (American Nonsmokers' Rights Foundation, 2020). To better understand the challenges faced by colleges and the efforts they have made toward vaping regulations, Texas A&M University was studied. Recognizing the health threats to its students from vaping, faculty and staff at Texas A&M University took action and became one of the largest higher education institutions to ban all vaping and e-cigarette products from its campuses. It also bans e-cigarette consumption and selling on its properties (Texas A&M, 2019). Texas A&M is not the first university in Texas to ban vaping. The University of Texas System had already, in 2017, banned vaping across 14 institutions. The powerful influence of other institutions of higher education is a driving force that has inspired more and more institutions to respond. Therefore, setting up an official organization that can connect with all higher education institutions across the nation may be a good way to promote vaping-free campuses and so protect young adults from being exposed to those who deliberately deliver vaping content, including off the internet (Texas A&M, 2019).

Conclusion and Future Proposals

Recent research and studies have provided a complete understanding and have proved that a correlation does exist between vaping advertisements and posts on social media and students' perceptions and behaviors related to vaping. Using actor-network theory analysis with data and facts collected from case studies and other methodologies, this paper further investigated both the digital and real-world sides of the story. Vaping advertisements appear in many contexts, including the internet, and expose the younger

generation to misleading marketing content. It is not enough to enforce regulations and laws with companies that rely on their advertising revenue; most of the social media platform providers do not have the motivation to change the current situation, but thankfully, some of the social media platforms already have policies in place to assist in slowing down the marketing of vaping. Vaping products attract consumers with their tempting flavors, such as fruit flavors, which are widely shared in social media posts. Vaping product providers have noticed the market profit available through the younger generation and have invested money and time on developing influencer marketing through the social media. The government has already taken action to limit the vaping companies' investment in social media channels that promote vaping products, but the vaping regulations still require a lot of improvement. Parents and students are starting to realize the importance of regulating vaping information on social media platforms, and some non-profit organizations are trying to minimize the effects of vaping on social media, but their voices need to be heard by more people. Schools have realized the threat of vaping and have tried to limit vaping on their campuses, but only a small percentage of higher education institutions have banned vaping entirely.

To raise public awareness, to reduce the effect of health advertisements and posts, and to increase the skills of students in recognizing untruthful information and in maintaining skepticism toward unverified information, we need all possible entities to contribute. Like all research, the study conducted for this paper has its limitations. The analysis explored several main entities but did not investigate the cohort effects on this matter. Furthermore, the paper focuses only on discussing the social and economic aspects of the story without giving much consideration to the science behind vaping. Building on the findings of this paper, several suggestions for future research can be proposed. Future studies can re-assess and expand the theory and framework addressed in this paper, or use a new analytic theory to study the "why" aspect of the story.

Conducting additional relevant studies in this field in the future will be beneficial, and topics such as the psychological aspect of vaping, the effect of different cultures and laws on vaping, or a medical analysis of vaping would all make a valuable contribution. A study into the psychology of vaping would help researchers understand how the aggressive social media marketing mechanisms work, and it could investigate the factors that promote vaping among young adults, such as peer pressure and the innovative appearances of some vaping products. Researchers may want to study the negative psychological impacts e-cigarettes can have on consumers, such as a lack of focus, anxiety, or even depression. The vaping culture may vary in different countries due to religious beliefs, the strictness of the vaping regulations, and more. Countries may exchange their experiences of regulations and education in relation to vaping. This research paper has briefly discussed some of the potential risks of vaping, but as much research and study has shown, the long-term impact of vaping remains unknown. It would be valuable to set up long-term experiments that record and analyze the health status of groups of e-cigarette consumers over a long period of time. The findings of that research would have the potential to define the future of vaping regulations.

Bibliography

Associated Press. (2020, January 2). Federal government bans popular e-cigarette flavors to curb underage vaping. Retrieved from https://www.marketwatch.com/story/federal-government-bans-popular-e-cigarettes-flavors-to-curb-underage-smoking-2020-01-02

Barker, J. O., & Rohde, J. A. (2019). Topic Clustering of E-Cigarette Submissions Among Reddit Communities: A Network Perspective. Health Education & Behavior, 46(2_suppl), 59S-68S. https://doi.org/10.1177/1090198119863770

Booth, S. (2019, January 9). Fake Health News Dangerous. Retrieved from https://www.healthline.com/health-news/how-fake-health-news-may-be-influencing-you- to-make-dangerous-decisions

Braidma. (2019, September 13). Tackling online disinformation. Retrieved from https://ec.europa.eu/digital-single-market/en/tackling-online-disinformation

CBS Interactive. (2019, September 20). E-cigarette panic is ruining "biggest public health opportunity" in 120 years, scientist says. CBS News. https://www.cbsnews.com/news/vaping-deaths-us-blowing-single-biggest-public-health-opportunity-in-120-years-as-debate-e-cigarettes-scientist/.

Chrissyfarr. (2019, June 2). This doctor is recruiting an army of medical experts to drown out fake health news on Instagram and Twitter. Retrieved from https://www.cnbc.com/2019/05/31/doctor-recruiting-doctors-to-fight-fake-health-info-on- social-media.html.

Colditz, J. B., Welling, J., Smith, N. A., James, A. E., & Primack, B. A. (2019). World Vaping Day: Contextualizing Vaping Culture in Online Social Media Using a Mixed Methods Approach. Journal of Mixed Methods Research, 13(2), 196–215. https://doi.org/10.1177/1558689817702753

Couzin-Frankel, J. (2019). Questions churn about vaping’s long-term risks. Science, 366(6469), 1059–1060. https://doi.org/10.1126/science.366.6469.1059

E-cigarettes: Facts, stats and regulations. (n.d.). Retrieved from https://truthinitiative.org/research-resources/emerging-tobacco-products/e-cigarettes-facts-stats-and-regulations

Facebook. (n.d.). Retrieved April 18, 2020, from https://www.facebook.com/policies/ads/prohibited_content/tobacco

Facebook Q4 2019 Earnings. (n.d.). Retrieved from https://investor.fb.com/investor-events/event-details/2020/Facebook-Q4-2019-Earnings/default.aspx

Grégoire, M.-C. (2019). Vaping risks for youth continue to emerge. CMAJ: Canadian Medical Association Journal, 191(40), E1113.

Griffiths, F., Dobermann, T., Cave, J. A., Thorogood, M., Johnson, S., Salamatian, K., … Goudge, J. (2015). The Impact of Online Social Networks on Health and Health Systems: A Scoping Review and Case Studies. Policy & internet, 7(4), 473–496. doi:10.1002/poi3.97

Harrell, P. T., Brandon, T. H., England, K. J., Barnett, T. E., Brockenberry, L. O., Simmons, V. N., & Quinn, G. P. (2019). Vaping Expectancies: A Qualitative Study among Young Adult Nonusers, Smokers, Vapers, and Dual Users. Substance Abuse: Research & Treatment, 13, N.PAG. https://doi.org/10.1177/1178221819866210

Jennie Z. Ma, Joy L. Hart, Kandi L. Walker, Aida L. Giachello, Allison Groom, Robyn L. Landry, Lindsay K. Tompkins, Thanh-Huyen T. Vu, Delvon T. Mattingly, Clara G. Sears, Anshula Kesh, Michael E. Hall, Rose Marie Robertson, Thomas J. Payne, Perceived health risks of electronic nicotine delivery systems (ENDS) users: The role of cigarette smoking status, Addictive Behaviors,Volume 91,2019,Pages 156-163,ISSN 0306-4603, https://doi.org/10.1016/j.addbeh.2018.10.044.

Lei Wang, Yongcheng Zhan, Qiudan Li, Daniel D. Zeng, Scott J. Leischow, & Janet Okamoto. (2015). An Examination of Electronic Cigarette Content on Social Media: Analysis of E-Cigarette Flavor Content on Reddit. International Journal of Environmental Research and Public Health, 12(11), 14916–14935. https://doi.org/10.3390/ijerph121114916

Nedelman, M., & Azad, A. (2019, June 07). US agencies go after vaping companies that paid social media influencers. Retrieved April 16, 2020, from https://www.cnn.com/2019/06/07/health/fda-ftc-influencer-marketing-vaping-ecigarettes-bn/index.html

Parents Against Vaping E-cigarettes. (n.d.). Retrieved April 18, 2020, from https://www.parentsagainstvaping.org/

Pokhrel, P., Fagan, P., Herzog, T. A., Laestadius, L., Buente, W., Kawamoto, C. T., Lee, H.-R., & Unger, J. B. (2018). Social media e-cigarette exposure and e-cigarette expectancies and use among young adults. Addictive Behaviors, 78, 51–58. https://doi.org/10.1016/j.addbeh.2017.10.017

Press Release (2019, September 19). Pallone Launches E&C Inquiry into Electronic

Cigarette Manufacturers. Retrieved April 16, 2020, from https://energycommerce.house.gov/newsroom/press-releases/pallone-launches-ec-inquiry-into-electronic-cigarette-manufacturers

Rowe, S., & Alexander, N. (2019). Fake Nutrition/Health News, Part 3: How (and Why) Did We Get Here? Nutrition Today, 54(4), 170–173. https://doi.org/10.1097/NT.0000000000000355

Sawdey, M. D., Hancock, L., Messner, M., & Prom-Wormley, E. C. (2017). Assessing the Association Between E-Cigarette Use and Exposure to Social Media in College Students: A Cross-Sectional Study. Substance Use & Misuse, 52(14), 1910–1917. https://doi.org/10.1080/10826084.2017.1319390

Schulenberg, John, et al. "Monitoring the Future National Survey Results on Drug Use, 1975-2018: Volume II, College Students and Adults Ages 19-60." 2019, doi:10.3998/2027.42/150623.

Skertich, N. J., Sullivan, G. A., Madonna, M. B., & Shah, A. N. (2019). Vaping is a risk factor for spontaneous pneumothorax: Two cases. Journal of Pediatric Surgery Case Reports, 50, N.PAG.

Smokefree and Tobacco-Free U.S. and Tribal Colleges and Universities. (2020, January 2). Retrieved from http://no-smoke.org/wp-content/uploads/pdf/smokefreecollegesuniversities.pdf

Sommariva, S., Vamos, C., Mantzarlis, A., Đào, L. U.-L., & Martinez Tyson, D. (2018). Spreading the (Fake) News: Exploring Health Messages on Social Media and the Implications for Health Professionals Using a Case Study. American Journal of Health Education, 49(4), 246–255. Retrieved from https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1183667&site=eds-live

Stanbrook, M. B. (2019). Vaping-associated lung illnesses highlight risks to all users of electronic cigarettes. CMAJ: Canadian Medical Association Journal, 191(48), E1319.

Teoh, F. (Ed.). (2019, June 28). The Most Popular Health Articles of 2018, a Scientific Credibility Review. Retrieved April 18, 2020, from https://healthfeedback.org/the-most-popular-health-articles-of-2018-a-scientific-credibility-review/

Texas A&M bans vaping across system. (n.d.). Retrieved from https://www.insidehighered.com/news/2019/10/03/texas-am-bans-vaping-across-system

Twitter. Tobacco and tobacco accessories. Retrieved April 18, 2020, from https://business.twitter.com/en/help/ads-policies/prohibited-content-policies/tobacco-and-tobacco-accessories.html

United States. Congress. House. Committee on Oversight and Reform. Subcommittee on Economic and Consumer Policy (2019). Don't Vape: Examining the Outbreak of Lung Disease and CDC's Urgent Warning Not to Use e-Cigarettes : Hearing Before the Subcommittee on Economic and Consumer Policy of the Committee on Oversight and Reform, House of Representatives, One Hundred Sixteenth Congress, First Session, September 24, 2019. Washington: U.S. Government Publishing Office.

Verhaegen, A., & Van Gaal, L. (2019). Vaping and Cardiovascular Health: the Case for Health Policy Action. Current Cardiovascular Risk Reports, 13(12), 1.

Wang, T., Gentzke, A., Creamer, M., Cullen, K., Holder-Hayes, E., Sawdey, M., . . . Neff, L. (2019, November 6). Tobacco Product Use and Associated Factors Among Middle and High School Students - United States, 2019. Retrieved April 16, 2020, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6903396/

Wang, Y., McKee, M., Torbica, A., & Stuckler, D. (2019). Systematic Literature Review on the Spread of Health-related Misinformation on Social Media. Social Science & Medicine, 240. https://doi.org/10.1016/j.socscimed.2019.112552