



INFORMING PUBLIC HEALTH

RESEARCH BRIEF

KDH Research & Communication

Number 31 :: July 2024

Including Environmental Impacts in Vape Prevention Messaging

Andrew Simkus, Kristen D. Holtz, Morgan L. Fleming, and Eric C. Twombly

Background

Adolescent use of vapes remains a major public health concern, as 7.7% of middle and high school students reported vaping in 2023.¹ To effectively curb vape use among adolescents, prevention messaging requires not only relevant information, but content that thoughtfully and accurately speaks to adolescents' interests and concerns. Much prevention messaging for adolescents has centered around the potential health risks of vape use but vapes also have a substantial environmental impact.² The production and improper disposal of vapes pollute the earth by introducing lithium, microplastics, and other contaminants into the environment.

Pointing out the environmental impacts from vape products may be a messaging strategy that captures the interest of adolescent vapers. In this brief, we review the environmental hazards related to vaping and present a conceptual strategy to expand vape prevention messaging by encouraging environmental concern among adolescents.

Vapes and the creation of environmental hazards

Lithium, a highly combustible, naturally occurring metal mined from the earth,³ has become synonymous with vaping-related environmental problems. Nearly all vape devices use energy from lithium batteries to vaporize liquid nicotine, which the user then inhales. Unsurprisingly, both the production and

improper disposal of vapes may lead to serious environmental damage over time.² Lithium mining has been criticized for leading to water shortages and damaging ecological systems.⁴ More damage occurs when vapes are inappropriately returned to the earth in the form of trash from which harmful chemicals leach into the ecosystem, poisoning our soil, water, wildlife,^{5,6} and ultimately ourselves.

The Environmental Protection Agency warns that lithium-based batteries should never be thrown away in household garbage or recycle bins but instead taken to professional battery recycling centers or hazardous waste collection sites.⁷ However, it has been estimated that only about 5 percent of lithium batteries used in the United States (US) are disposed of in accordance with these guidelines.⁸ Thus, a substantial amount of hazardous waste enters our environment through inappropriately discarded lithium batteries from vapes. This problem is not confined to the US. For example, Greenpeace, an organization committed to improving environmental policies, reported that during 2022 discarded vapes in the United Kingdom accounted for over 10 tons of lithium, enough to create batteries for 1,200 electric cars.⁹

Disposable vapes became the most popular tobacco product among adolescents when the Food and Drug Administration began enforcing its flavor ban¹⁰ of cartridge-based vapes in 2020. Total vape sales per 4-week period in the US grew from 15.5 million in 2020 to 22.7 million in 2022.¹¹ This rapid increase was spurred by sales of disposable vapes, which surged from less than 25 percent of total vape sales in 2020 to over 50 percent in 2022.¹¹

Concomitantly, a 1,000 percent increase in single-use vaping products among high school students occurred from 2019 to 2020.¹²

Predictably, this huge increase in vaping has led to a related increase in vaping trash, most of which does not find its way to approved waste collection sites. Most adolescent vapers (74 percent) surveyed by the Truth Initiative in 2020 found it difficult to identify appropriate drop-off locations for lithium batteries.¹³ The same survey revealed that 49 percent of vaping adolescents do not know where to dispose of their vape cartridges or pods and batteries, with 51 percent reportedly throwing their used vapes in regular trash, and 10 percent throwing them on the ground.¹³ As vape use continues to increase, the amount of lithium that contaminates the soil and ground water will increase as well.

Lithium is not the only vaping byproduct dangerous to the environment. Inappropriate disposal of vaping cartridges and pods introduces plastics, nicotine salts, and heavy metals, including lead and mercury, into the environment, where they break down into microplastics and chemicals that contaminate soil and waterways.¹³

Messaging strategy

Although there is much content for environment-based prevention messaging, research suggests that younger generations are less interested in protecting the environment than previous generations.¹⁴ Environmental concern among adolescents rose during the 1990s, but it has declined ever since.¹⁵ This trend warrants consideration when considering infusing environmentalism into other messages intended for youth today.

We suggest that combined and well-targeted messaging on the environmental hazards of disposable vapes may help curtail disposable vape use while simultaneously creating an opportunity to discuss and increase environmental mindfulness among adolescents. We propose a conceptual, holistic messaging strategy that combines education about the environmental hazards of vaping with information regarding the associated personal and public health risks. Adolescents' ratings of the perceived efficacy of different types of vape prevention messaging vary. Novel messages, in particular, garner substantial amounts of attention.¹⁶ Therefore, it is likely that prevention messages that marry environmental and personal protection from vape hazards could be attention grabbing and persuasive.

Synthesizing strategies to increase reach

Prevention messaging that incorporates negative graphic images have been rated by adolescents as highly effective¹⁶ and this principal could be applied to increase the effectiveness of environment-related messaging. Lithium mining has dramatic environmental impacts, as does lithium poisoning on the body. Moreover, because health risks have been shown to be effective in other types of prevention messaging, educating adolescents about the health risks associated with environmental harm may help reinforce environmental regard. By addressing a broader span of prevention topics, a holistic messaging approach that synthesizes the harms that vapes can have on both the user and the shared environment may engage a larger range of adolescents.

Focusing an environmental lens on vape prevention messaging may also stimulate peer vape concern. Adolescents who have used vapes have significantly less knowledge about the environmental impact of vape litter than adolescents who have never vaped.¹³ Informing teens who vape about the environmental hazards of vaping may increase their awareness of the real shared risks of environmental contamination, and in turn foster more conversations among adolescents about the collective dangers associated with vaping. Messaging that details the impact of individuals' vaping on their friends has been noted as a promising prevention topic.¹⁶ The confluence of individual and collective risk offers an avenue for messaging that is personally relevant to adolescents. Messaging on vape prevention and messaging on environmentalism are both more likely to be effective when framed with personally relevant material.¹⁷⁻¹⁹

Conclusion

Vapes harm both individuals and the environment. Thus, prevention messaging may be potentiated by presenting a synthesized message that address three alarming concerns: adolescents' uptake and use of vapes, how they dispose of these environmentally hazardous devices, and the health risks associated with vaping and environmental contamination. Such a robust approach may prove fruitful in deterring adolescent vaping while increasing positive environmental and health behaviors.

References

- ¹ Birdsey, J., Cornelius, M., Jamal, A. et al. Tobacco Product Use Among U.S. Middle and High School Students – National Youth Tobacco Survey, 2023. *MMWR Morb Mortal Wkly Rep* 2023;72: 1173-1182. DOI: <http://dx.doi.org/10.15585/mmwr.mm7244a1>
- ² Pourchez, J., Mercier, C., & Forest, V. (2022). From smoking to vaping: a new environmental threat?. *The Lancet Respiratory Medicine*, 10(7), e63-e64.
- ³ Morris, Manning & Martin LLP. (2018). *The Role of the Lithium-Ion Battery in E-Cig Malfunction Cases*. <https://www.mmmlaw.com/media/the-role-of-the-lithium-ion-battery-in-e-cig-malfunction-cases/>
- ⁴ Campbell, M. (2022, August 15). *In pictures: South America's "lithium fields" reveal the dark side of our electric future*. Euronews. <https://www.euronews.com/green/2022/02/01/south-america-s-lithium-fields-reveal-the-dark-side-of-our-electric-future#:~:text=Why%20is%20lithium%20extraction%20bad,an%20increase%20in%20global%20warming>
- ⁵ Center for Tobacco Products. (2020, September 23). *Tips for Safe Disposal of E-Cigarettes and E-Liquid Waste*. U.S. Food and Drug Administration. <https://www.fda.gov/tobacco-products/products-ingredients-components/tips-safe-disposal-e-cigarettes-and-e-liquid-waste#:~:text=Nicotine%20Is%20an%20Acute%20Hazardous%20Waste&text=Discarded%20or%20neglected%20vaping%20products,%2C%20including%20unused%20e%2Dliquid.&text=Improper%20storage%20and%20disposal%20of,exposure%20and%20accidental%20nicotine%20poisoning>
- ⁶ Center for Disease Control. (n.d.). *Nicotine: Systemic Agent | NIOSH | CDC*. https://www.cdc.gov/niosh/ershdb/emergencyresponsecard_29750028.html#:~:text=DESCRIPTION%3A%20Nicotine%20is%20a%20naturally,processing%20and%20extraction%20of%20tobacco
- ⁷ Used household batteries | US EPA. (n.d.). <https://www.epa.gov/recycle/used-household-batteries>
- ⁸ Webb, K., Bergin, C., & Fracassi, T. (2023, June 7). https://www.environmentallawandpolicy.com/2023/06/u-s-epa-issues-faq-memo-on-lithium-ion-battery-management-under-rcra/#_ftn3. U.S. EPA Issues FAQ Memo on Lithium-Ion Battery Management Under RCRA. https://www.environmentallawandpolicy.com/2023/06/u-s-epa-issues-faq-memo-on-lithium-ion-battery-management-under-rcra/#_ftn3
- ⁹ Scheiby, K. (2023, July 25). *Are disposable vapes bad for the environment?*. Greenpeace UK. <https://www.greenpeace.org.uk/news/are-disposable-vapes-bad-for-the-environment/#:~:text=Over%2010%20tonnes%20of%20lithium,used%20up%20to%20300%20times>
- ¹⁰ Gaiha, S. M., Lempert, L. K., McKelvey, K., & Halpern-Felsher, B. (2022). E-Cigarette devices, brands, and flavors attract youth: informing FDA's policies and priorities to close critical gaps. *Addictive Behaviors*, 126, 107179.
- ¹¹ Ali, F. R. M. (2023). E-cigarette Unit Sales by Product and Flavor Type, and Top-Selling Brands, United States, 2020–2022. *MMWR. Morbidity and Mortality Weekly Report*, 72.
- ¹² Wang TW, Neff, Linda J, Park-Lee, Eunice, Ren, Chunfeng, Cullen, Karen A, King, Brian A. E-cigarette use among middle and high school students—United States, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69.
- ¹³ Truth initiative. (February 2021). <https://truthinitiative.org/sites/default/files/media/files/2021/04/E-Cigarette-Waste-Report-FINAL-042821.pdf>
- ¹⁴ Gray, S. G., Raimi, K. T., Wilson, R., & Arvai, J. (2019). Will Millennials save the world? The effect of age and generational differences on environmental concern. *Journal of environmental management*, 242, 394-402.
- ¹⁵ Wray-Lake, L., Flanagan, C. A., & Osgood, D. W. (2010). Examining trends in adolescent environmental attitudes, beliefs, and behaviors across three decades. *Environment and behavior*, 42(1), 61-85.
- ¹⁶ Stalgaitis, C. A., Jordan, J. W., & Isaac, K. (2023). Creating More Effective Vape Education Campaigns: Qualitative Feedback from Teens in Nine U.S. States. *Substance use & misuse*, 58(3), 406–418. <https://doi.org/10.1080/10826084.2023.2165411>
- ¹⁷ Boynton, M. H., Sanzo, N., Brothers, W., Kresovich, A., Sutfin, E. L., Sheeran, P., & Noar, S. M. (2023). Perceived effectiveness of objective elements of vaping prevention messages among adolescents. *Tobacco Control*, 32(e2), e228-e235.
- ¹⁸ Section on Tobacco Control, Groner, J. A., Nelson, K. E., Etzel, R. A., Wilson, K. M., Farber, H. J., ... & Moore, J. E. (2015). Clinical practice policy to protect children from tobacco, nicotine, and tobacco smoke. *Pediatrics*, 136(5), 1008-1017.
- ¹⁹ Anspach, N. M., & Draguljić, G. (2019). Effective advocacy: The psychological mechanisms of environmental issue framing. *Environmental Politics*, 28(4), 615-638.

Acknowledgements

Edited by Elaine Eldridge, PhD.
This research was self-funded.



KDH RESEARCH &
COMMUNICATION

145 15th Street NE,
Suite 831
Atlanta, GA 30309

www.kdhrc.com
publicaffairs@kdhrc.com



ANDREW SIMKUS
was an Analyst at
KDH Research &
Communication.



KRISTEN D. HOLTZ is
the Founder and
President at KDH
Research &
Communication.



**MORGAN L.
FLEMING** is a
Program Assistant at
KDH Research &
Communication.



ERIC C. TWOMBLY
is a Senior Fellow at
KDH Research &
Communication.

KDH RESEARCH & COMMUNICATION is a non-partisan, public health, research and communications agency. The goal of the “Informing Public Health” brief series is to disseminate innovative, objective, and timely information to solve public health and other social issues. KDHRC actively contributes to a future when all people can find, understand, and act on information to safeguard the health of themselves, their families, and their communities.

The views expressed here are those of the authors and do not necessarily reflect those of KDH Research & Communication, its board, or funders. Permission is granted for reproduction of this document with attribution to KDH Research & Communication.
