



# Washington State Liquor and Cannabis Board

## Research Brief Flavored Cannabis Vape Products

July 2024

### LCB Research Program

The research program at the Washington State Liquor and Cannabis Board (LCB) is a non-partisan, transparent resource focused on public health and safety outcomes related to the products, policy, and regulation of alcohol, cannabis, tobacco, and vapor products.

### Purpose

The purpose of this brief is to summarize research literature on flavored cannabis vape products, their prevalence and appeal in adults and youth, and future considerations. This brief is based on a review of existing evidence including scientific literature, government reports, policies, and other credible information sources.

This document does not represent an official position of LCB.

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## Background

The term “flavored cannabis vape product” refers to any cannabis concentrate intended for vapor inhalation with added compounds (e.g., terpenes, artificial flavors) to enhance its flavor. The practice of adding flavor into vape pens or cartridges is common because the THC extraction process used to create concentrates removes naturally-occurring flavors found in the cannabis plant.<sup>1-2</sup>

Cannabis vape products are typically flavored using: (1) naturally-occurring terpenes that come from the cannabis plant, (2) naturally-occurring terpenes from other plant sources (e.g., herbs, fruit), (3) synthetic- or natural flavoring additives (e.g., artificial flavors), or (4) a combination of these.<sup>1-2</sup>

Flavoring additives labeled as natural, artificial, botanical, or synthetic have no legal definition and are broadly unregulated, thus posing a potential risk to public safety and health.<sup>2-3</sup> Naturally-occurring terpenes used in their raw form are generally regarded as safe, although the extent to which inhaling terpenes is safe needs further research.<sup>4</sup> Infusing cannabis oil using terpenes from other plants, rather than cannabis-derived terpenes, is common due to lower cost and increased consistency in the final product.<sup>2</sup>

## Prevalence

*Legal Adults.* The use and popularity of flavored cannabis vape products have increased alongside cannabis legalization.<sup>5-6</sup> A recent study found that about 57% of U.S. adults who vaped cannabis in the past year used products that were flavored.<sup>5</sup> In 2023, over 70% of people living in Washington

who vaped concentrates in the past-year reported either using flavored vapes or were not sure whether the vapes they used were flavored.<sup>7</sup> The most preferred and frequently used flavors appear to be fruit (e.g., peach, berry) and desserts/sweets (e.g., cookies, cake).<sup>5,7</sup> Emerging research also suggests ethnic-racial minorities, females, those with higher socio-economic status, and those who use cannabis more frequently have increased rates of flavored vape use.<sup>5,7</sup>

*Young Adults and Youth.* Young people report flavored cannabis vape products (particularly candy and cooling flavors) as appealing.<sup>8-11</sup> The 2023 Washington State Healthy Youth Survey indicated that of the about 7% of 10<sup>th</sup> graders who report current cannabis use, about half used flavored cannabis vape products.<sup>12</sup> In general, younger people are more likely to use cannabis vape products relative to older adults, regardless of flavor.<sup>13-15</sup> Evidence from the tobacco literature indicates flavors are one factor in youth initiation of substance use.<sup>16-19</sup> Young people who use flavored vape products tend to have higher lifetime use of alcohol, cannabis, tobacco, and other drug use, suggesting that youth who use flavored cannabis vape products may be at higher-risk for polysubstance use.<sup>20</sup> Therefore, interventions focused on these higher-risk youth groups are important.

*Medical Patients.* Flavored cannabis vape products may have therapeutic potential for medical cannabis patients. Although more research on this topic is needed, terpenes have received wide attention for their potential to mitigate certain health conditions such as chronic pain, sleeplessness, and

inflammation.<sup>21-24</sup> Most of this research so far, however, has examined these effects in animals, making the generalizability to humans limited.

### **Examples of Current Regulations in the U.S. and Canada**

New York state requires flavoring be derived from botanical sources (cannabis or other plant sources) and restricts any use of synthetic terpenes.<sup>25</sup> New York also banned flavors that are especially appealing to youth, such as mint, cotton candy, and bubble gum.<sup>25</sup> Some states, including New York and New Jersey, additionally require flavored products to contain no more than 10% total terpenes, limiting the ability to produce heavily flavored products.<sup>25-26</sup> Connecticut has further mandated flavors/terpenes be sourced only from cannabis grown and regulated in-state.<sup>27</sup> Canada has regulations that restrict inhalable cannabis extracts from any flavor other than the flavor of cannabis across both medical and non-medical cannabis.<sup>28</sup>

### **Current Regulations in Washington**

According to [RCW 69.50.327](#), Washington allows flavoring in cannabis vape products if the flavor is “*derived from botanical terpenes naturally occurring in the cannabis plant, regardless of source, and if the characterizing flavor mimics the terpene profile found in the cannabis plant. Characterizing flavors do not include synthetic terpenes.*”<sup>29</sup> The sale of flavored vapor products was temporarily prohibited by executive order on October 10, 2019 in response to a multistate outbreak of vape-associated lung injury (VALI); the ban expired on February 8, 2020.<sup>30</sup>

### **Summary**

A summary of current research and government sources show that:

- Not all flavoring agents are the same.<sup>1-2</sup> There are many naturally-occurring terpenes that can be derived from the cannabis plant. The most concerning flavoring agents are those that are synthetic or artificial.
- Flavored products do appeal to some youth.<sup>8-11</sup> These products are also increasingly popular among legal adult consumers.<sup>5,25-26</sup>
- Not all demographics appear to use these products at similar rates. Emerging research indicates that ethnic-racial minorities and females may be more likely to use flavored cannabis vape products.<sup>6-7</sup>
- If there was interest to restrict terpenes to only those derived from cannabis, it would be difficult to enforce because current lab tests cannot easily determine the source of naturally-occurring terpenes.<sup>1</sup>
- There are potential therapeutic properties of terpenes that medical cannabis patients might benefit from.<sup>20-23</sup> Additional research on this topic, particularly studies with human participants, would be helpful.

### **Best Practices**

The following best practices for public health and safety related to flavored cannabis vape products are based on a review of scientific literature and state policies. They do not represent an official position from LCB.

- Disclose any use of and concentration of any non-cannabis additives or ingredients. Specify on item label there are non-cannabis additives. This is consistent with Oregon’s rules.<sup>2</sup>

- Create clear definitions of ‘natural’, ‘botanical’, ‘synthetic,’ and ‘artificial’ flavor additives to create clear understanding of these terms.
- Clarify flavors that are predominantly found in cannabis, such as earthy, woody, herbal, citrus, lemon, sweet, and pungent.<sup>1</sup> Youth appear to be drawn more to candy and cooling flavors.<sup>8-11</sup>
- Determine safe limits for the percent of total terpenes that can be added in cannabis oil (e.g., <10%). This aligns with other state regulations (NY, NJ) and would reduce heavily flavored products.
- Promote evidence-based education or health warnings to increase awareness of potential risk factors in the use of flavored vapes.
- Limit availability of flavors that appeal more strongly to youth than to adults. One potential option is to make them only available in the medical market.
- Support and advance research to further understand the short- and long- term effects of terpenes derived from cannabis, other botanical sources, and synthetic sources.

## References

1. Sommano, S. R., Chittasupho, C., Ruksiriwanich, W., & Jantrawut, P. (2020). The cannabis terpenes. *Molecules*, *25*(24), 5792
2. Oregon Liquor Control Commission (2020) Non-Cannabis Additives in Inhalable Cannabinoid Products: Rationale for Rulemaking.
3. Hallagan, J. B. (2017). The use of diacetyl (2, 3-butanedione) and related flavoring substances as flavorings added to foods—Workplace safety issues. *Toxicology*, *388*, 1-6.
4. Cox-Georgian, D., Ramadoss, N., Dona, C., & Basu, C. (2019). Therapeutic and medicinal uses of terpenes. *Medicinal plants: from farm to pharmacy*, 333-359.
5. D'Mello, K., Chan, G. C., Hall, W., Rychert, M., Wilkins, C., & Hammond, D. (2023). Use of flavored cannabis vaping products in the US, Canada, Australia, and New Zealand: findings from the international cannabis policy study wave 4 (2021). *The American Journal of Drug and Alcohol Abuse*, *49*(5), 640-651.
6. Watkins, S. L., Thompson, J., Feld, A. L., Ling, P. M., & Lee, Y. O. (2023). Flavored Cannabis Use and Cannabis-Tobacco Co-use: Patterns In US States With Legalized Nonmedical Adult Use. *American journal of preventive medicine*.
7. International Cannabis Policy Study (2024) Washington 2023 Cannabis Report.
8. Werts, M., Urata, J., Watkins, S. L., & Chaffee, B. W. (2021). Peer Reviewed: Flavored Cannabis Product Use Among Adolescents in California. *Preventing chronic disease*, *18*.
9. Canada Department of Health (2021) Regulations Amending the Cannabis Regulations (Flavours in Cannabis Extracts) Canada Gazette, Part 1, Volume 155, Number 25.
10. Health Canada. [\(ARCHIVED\) Final Report: Understanding Youth and Young Adults' Interest in, and Usage of, Flavoured Cannabis Vaping Products \(PDF\)](#). 2020.
11. Jones, C. B., Hill, M. L., Pardini, D. A., & Meier, M. H. (2016). Prevalence and correlates of vaping cannabis in a sample of young adults. *Psychology of Addictive Behaviors*, *30*(8), 915.
12. 2023 Healthy Youth Survey. Statewide Results (2022).
13. Chaffee, B. W., Couch, E. T., Wilkinson, M. L., Donaldson, C. D., Cheng, N. F., Ameli, N., ... & Gansky, S. A. (2023). Flavors increase adolescents' willingness to try nicotine and cannabis vape products. *Drug and alcohol dependence*, *246*, 109834.
14. Fataar, F., & Hammond, D. (2019). The prevalence of vaping and smoking as modes of delivery for nicotine and cannabis among youth in Canada, England and the United States. *International journal of environmental research and public health*, *16*(21), 4111.
15. Hammond, D., Goodman, S., Wadsworth, E., Freeman, T. P., Kilmer, B., Schauer, G., ... & Hall, W. (2022). Trends in the use of cannabis products in Canada and the USA, 2018–2020: Findings from the International Cannabis Policy Study. *International Journal of Drug Policy*, *105*, 103716.
16. Huang L, Baker HM, Meernik C, Ranney LM, Richardson A, Goldstein AO. Impact of non-menthol flavours in tobacco products on perceptions and use among youth, young adults and adults: a systematic review. *Tob Control*. 2017;*26*:709–19. doi:10.1136/tobaccocontrol-2016-053196
17. US Department of Health and Human Services. Preventing tobacco use among youth and young adults: a report of the surgeon general.
18. Gendall P, Hoek J. Role of flavours in vaping uptake and cessation among New Zealand smokers and non-smokers: a cross-sectional study. *Tob Control*. 2021;*30*:108–10. doi:10.1136/tobaccocontrol-2019-055469.
19. Rostron BL, Cheng Y, Gardner LD, Ambrose BK. Prevalence and reasons for use of flavored cigars and ENDS among US youth and adults: estimates from wave 4 of the PATH study, 2016-2017. *Am J Health Behav*. 2020;*44*:76–81. doi:10.5993/AJHB.44.1.8.
20. Knapp, A. A., Lee, D. C., Borodovsky, J. T., Auty, S. G., Gabrielli, J., & Budney, A. J. (2019). Emerging trends in cannabis

- administration among adolescent cannabis users. *Journal of Adolescent Health*, 64(4), 487-493.
21. Liktor-Busa, E., Keresztes, A., LaVigne, J., Streicher, J. M., & Largent-Milnes, T. M. (2021). Analgesic potential of terpenes derived from Cannabis sativa. *Pharmacological Reviews*, 73(4), 1269-1297.
  22. Cox-Georgian, D., Ramadoss, N., Dona, C., & Basu, C. (2019). Therapeutic and medicinal uses of terpenes. *Medicinal plants: from farm to pharmacy*, 333-359.
  23. Downer, E. J. (2020). Anti-inflammatory potential of terpenes present in Cannabis sativa L. *ACS Chemical Neuroscience*, 11(5), 659-662.
  24. Lowe, H., Steele, B., Bryant, J., Toyang, N., & Ngwa, W. (2021). Non-cannabinoid metabolites of Cannabis sativa L. with therapeutic potential. *Plants*, 10(2), 400.
  25. New York State Office of Cannabis Management (2023). Requirements for Flavored Vaporized or Inhaled Cannabis Products. [requirements-for-flavored-vaporized-or-inhaled-cannabis-products.pdf \(ny.gov\)](https://www.opm.ny.gov/requirements-for-flavored-vaporized-or-inhaled-cannabis-products.pdf)
  26. New Jersey Cannabis Regulatory Commission (2022). The New Jersey Cannabis Regulatory Commission's Testing Guidance ([CRC Testing Guidance 9.28.22.pdf \(nj.gov\)](https://www.nj.gov/cannabis/regulatory-commission/testing-guidance-9-28-22.pdf)).
  27. Department of Consumer Protection (2022). Connecticut Regulation of Adult Use Cannabis. [Microsoft Word - {2FE0CE3C-1CCA-47DC-B4DD-BADC93378343}Operational Policies - updated 01-10-2022.docx \(ct.gov\)](https://www.ct.gov/dcp/lib/dcp/operational-policies-use-cannabis-2022.docx)
  28. Government of Canada (2021). Canada Gazette, Part I, Volume 155, Number 25: Regulations Amending the Cannabis Regulations (Flavours in Cannabis Extracts). [Canada Gazette, Part 1, Volume 155, Number 25:](https://www.gazette.gc.ca/online/online-155-25-2021/online-155-25-2021.html)
  29. Washington State Legislature (2022) RCW. 69.50.327. Cannabis Processors-Incorporation of Characterizing Flavor in Vapor Products. [RCW 69.50.327: Cannabis processors—Incorporation of characterizing flavor in vapor products. \(wa.gov\)](https://leg.wa.gov/RCW/default.aspx?cite=69.50.327)
  30. Washington State Liquor and Cannabis Board. (2019). Press Release: Sale of Flavored Vapor Products is Prohibited – Effective Oct. 10, 2019
  31. Goodman, S., Wadsworth, E., Leos-Toro, C., Hammond, D., & International Cannabis Policy Study team. (2020). Prevalence and forms of cannabis use in legal vs. illegal recreational cannabis markets. *International Journal of Drug Policy*, 76, 102658.
  32. Thompson, K., Thibault, T., & Peters, A. L. (2023). A better high? Understanding mode preferences among young adult cannabis users. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*.