

MARIJUANA POTENCY

a resource produced by:
Smart Approaches to Marijuana

3%

23%

In the 1970s, “Woodstock Weed” contained roughly 1–3% THC. Since then, potency of marijuana plant material has increased to an average potency of 18-23% today.



6.2 million daily users in 2009



13.8 million daily users in 2018

Daily users of high potency THC are five times more likely to develop a severe mental illness.

MORE THC

56%

99%

In 2017, THC concentrates had an average THC potency of 55.7%. Today, many retailers promote and profit from products containing up to 95–99% THC.

INCREASED USE

Americans 12 and older who reported using marijuana daily or almost daily increased from 6.2 million in 2009 to 13.8 million in 2019.

GREATER HARM

High potency and high frequency marijuana use are associated with the most severe impacts on mental health.

Marijuana Potency

A resource prepared by Smart Approaches to Marijuana

The concentration or potency of Tetrahydrocannabinol (THC), the psychoactive component of marijuana, has increased dramatically over the past few decades, both in plant material and in concentrates. Higher potency marijuana has been found to be more addictive, and the younger the user, the higher the likelihood of developing a Cannabis Use Disorder (CUD, or addiction). High potency marijuana exacerbates many of the consequences of marijuana use both short and long term, but translates to a big money maker for the pot industry. This is evidenced by their vociferous opposition to any potency cap even though ample evidence shows such a policy would likely improve health outcomes.

Background: Dramatic Increase in Potency

In the 1970s, “Woodstock Weed” contained roughly 1–3% THC.¹ Since then, potency of marijuana plant material has steadily increased from 9.75% in 2009 to 14.88% in 2018² to an average potency of 18-23% today³.

THC concentrates such as shatter, budder, and waxes—as well as gummies and edibles—are packed with more THC than joints ever were. One researcher said that “concentrates are as close to the cannabis plant as strawberries are to frosted strawberry Pop Tarts.”⁴

Concentrates are often ingested by heating the concentrate until a vapor forms (dabbing), are consumed through food (edibles), are vaped, or are applied topically. In 2008, concentrates had an average THC potency of 6.7% but jumped to 55.7% in 2017.⁵ Today, many marijuana retailers promote and profit from products containing up to 95–99% THC.⁶

The Danger: Harms of High Potency Marijuana

High potency and high frequency of marijuana use are associated with the most severe impacts on mental health.⁷

Short-term harms:

Overdoses⁸
Marijuana related Hospitalizations⁹ and ER visits¹⁰
Accidental child ingestion and a rise in marijuana-related poison control calls¹¹
Cannabinoid hyperemesis syndrome (repetitive cycles of nausea and vomiting)¹²

Long-term harms:

THC addiction¹³
Psychosis¹⁴
Depression¹⁵
Anxiety¹⁶
Suicide¹⁷
Reshaping of brain matter¹⁸

- At least 56 scientific studies have confirmed the link between high potency marijuana and psychosis including a 2020 study published in the Journal of American Medicine. This study found that high potency THC use was associated with “significant increases” in addiction and mental health disorders.¹⁹
- A landmark 2019 study published in The Lancet concludes that the risk of psychosis triples when using products with 15% THC potency or higher, and daily users are five times more likely to develop a severe mental illness such as psychosis or schizophrenia.²⁰
- One study, published in Schizophrenia Research, found evidence to “suggest a psychotic risk with cannabis wax,” well beyond the already risky lower potency marijuana products.²¹

Higher potency products are associated with the rise in daily and near daily use of marijuana. According to the Substance Abuse and Mental Health Services Administration, the number of Americans 12 and older who reported using marijuana daily or almost daily in the past 30 days increased from 6.2 million in 2009 to 13.8 million in 2019.²²

The Solution: Suggested Policies

There is no reputable evidence supporting the use of high THC concentrates for therapeutic purposes, and they are associated with the most harm. Cancer pain, outside of some very specific and rare forms of epilepsy, is generally the only medical condition where there exists more than just anecdotal evidence that some kind of marijuana use could be beneficial.²³

A 2020 study found that 90% of marijuana products sold as “medical” marijuana featured THC levels in excess of 15% — which is about two to three times higher than the amount shown to provide neuropathic pain relief.²⁴ The authors of this study recommended that “medical” marijuana regimes impose a THC potency limit of 10% or less to reduce the risk of short and long-term side effects.

Consider not allowing for the sale of concentrates altogether, aside from those in tinctures meant to be administered orally in droplets. The scant medical guidance available related to THC dosing recommends titrating up by 2.5mg or 5mg at a time and judging impact before increasing dose. All products sold should allow for this type of titration - i.e., not include high-potency flower (much less concentrates) that encourage very high THC dosing per administration session. Functionally, capping all product potency at 15%, or 5mg per unit of an edible (e.g., 5mg per gummy) is recommended.

Restrict edibles and concentrates as much as possible as they represent the most serious danger for public health. These products’ high potency, resemblance to non-laced consumer products (such as candy, lotions, etc.), and ease of use create serious, costly problems. They must be heavily regulated to prohibit their advertising, sales, and use.

Sample Legislative Language

Vermont has successfully adopted a potency cap on plant material (flower) and concentrates. The language adopted by the Vermont legislature that pertains to potency caps:

PROHIBITED PRODUCTS

(a) The following are prohibited products and may not be cultivated, produced or sold pursuant to a license issued under this chapter:

- (1) cannabis flower with greater than 30 percent tetrahydrocannabinol;
- (2) solid concentrate cannabis products with greater than 60 percent tetrahydrocannabinol;

Policy Success: Marijuana Potency Limit Success Story

In a 2018 study, researchers examined potency restrictions in the Netherlands.²⁵ They found that marijuana potency doubled from just below 9% THC in 2000 to above 20% by 2004. This drastic increase was followed by a rise in the amount of people seeking treatment for marijuana issues. When the potency declined to 15% in 2015, treatment admissions for marijuana issues fell. Researchers estimated that for every 3% increase in THC potency, one person in 100,000 would seek first-time treatment for marijuana use disorder. These findings among others led the Netherlands to cap potency at 15%.²⁶

Conclusion

As potency increases, negative harms increase. There is no reason the marijuana industry should be unchecked and left alone to create highly addicting and potent products and push them to consumers. The increasing demand for high potency marijuana products and the coinciding prevalence of marijuana use disorder are indicative of a future maelstrom with unknown consequences for public health, especially as the industry engages in a concerted effort to undermine scientifically proven risks of marijuana use. A potency cap is a rational way to reduce harms and potentially save lives.

Endnotes

- 1 ElSohly, M. A., Ross, S. A., Mehmedic, Z., Arafat, R., Yi, B., & Banahan, B. F. (2000). Potency trends of delta9-THC and other cannabinoids in confiscated marijuana from 1980–1997. *Journal of Forensic Sciences*, 45(1), 24–30.
- 2 El Sohly Mahmoud A et al. “A Comprehensive Review of Cannabis Potency in the USA in the Last Decade.” *Biol Psychiatry Cogn Neurosci Neuroimaging*. 2021 Jan 25:S2451-9022(21)00022-7. doi: 10.1016/j.bpsc.2020.12.016.
- 3 Cannabis Policy: Public Health and Safety Issues and Recommendations. Caucus on International Narcotics Control, United States Senate, March 3, 2021, Washington, D.C. Report, <https://www.drugcaucus.senate.gov/sites/default/files/02%20March%202021%20-%20Cannabis%20Policy%20Report%20-%20Final.pdf>.
- 4 Jewell-Stern, F., & Luter, E. (2021, February 12). High-potency THC products are a problem we must address. Retrieved March 26, 2021, from <https://coloradonewsline.com/2021/02/12/high-potency-thc-products-are-a-problem-we-must-address/>
- 5 Chandra, S., Radwan, M. M., Majumdar, C. G., Church, J. C., Freeman, T. P., & ElSohly, M. A. (2019). New trends in cannabis potency in USA and Europe during the last decade (2008–2017). *European Archives of Psychiatry and Clinical Neuroscience*, 269(1), 5–15. <https://doi.org/10.1007/s00406-019-00983-5>
- 6 Prince, M. A., & Conner, B. T. (2019). Examining links between cannabis potency and mental and physical health outcomes. *Behaviour Research and Therapy*, 115, 111–120. <https://doi.org/10.1016/j.brat.2018.11.008>
- 7 Di Forti, M., Quattrone, D., Freeman, T. P., Tripoli, G., Gayer-Anderson, C., Quigley, H., Rodriguez, V., Jongsma, H. E., Ferraro, L., La Cascia, C., La Barbera, D., Tarricone, I., Berardi, D., Szöke, A., Arango, C., Tortelli, A., Velthorst, E., Bernardo, M., Del-Ben, C. M., ... van der Ven, E. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): A multicentre case-control study. *The Lancet Psychiatry*, 6(5), 427–436. [https://doi.org/10.1016/S2215-0366\(19\)30048-3](https://doi.org/10.1016/S2215-0366(19)30048-3)
- 8 Adams, Jerome. U.S. Surgeon General’s Advisory: Marijuana Use and the Developing Brain. U.S. Department of Health and Human Services, August 29, 2019, <https://www.hhs.gov/surgeongeneral/reports-andpublications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html>.
- 9 Smart Approaches to Marijuana (SAM). (2020). Lessons Learned from State Marijuana Legalization. Retrieved March 25, 2021, from <https://learnaboutsam.org/wp-content/uploads/2020/12/2020-Impact-Report1.pdf>.
- 10 Troyer, B. (2021, February 15). Marijuana potency must be capped for a safe and healthy Colorado. Retrieved March 26, 2021, from <https://www.denverpost.com/2021/02/15/bob-troyer-marijuana-potency-must-be-capped-for-a-safe-and-healthy-colorado/>
- 11 Smart Approaches to Marijuana (SAM). (2020). Lessons Learned from State Marijuana Legalization. Retrieved March 25, 2021, from <https://learnaboutsam.org/wp-content/uploads/2020/12/2020-Impact-Report1.pdf>.
- 12 Adams, Jerome. U.S. Surgeon General’s Advisory: Marijuana Use and the Developing Brain. U.S. Department of Health and Human Services, August 29, 2019, <https://www.hhs.gov/surgeongeneral/reports-andpublications/addiction-and-substance-misuse/advisory-on-marijuana-use-and-developing-brain/index.html>.
- 13 Jewell-Stern, F., & Luter, E. (2021, February 12). High-potency THC products are a problem we must address. Retrieved March 26, 2021, from <https://coloradonewsline.com/2021/02/12/high-potency-thc-products-are-a-problem-we-must-address/>
- 14 Di Forti, Marta, et al. “The Contribution of Cannabis use to Variation in the Incidence of Psychotic Disorder across Europe (EU-GEI): A Multicentre Case-Control Study.” *The Lancet Psychiatry* 6.5 (2019): 427-436., <https://pubmed.ncbi.nlm.nih.gov/30902669/>.
- 15 Troyer, B. (2021, February 15). Marijuana potency must be capped for a safe and healthy Colorado. Retrieved March 26, 2021, from <https://www.denverpost.com/2021/02/15/bob-troyer-marijuana-potency-must-be-capped-for-a-safe-and-healthy-colorado/>
- 16 Ibid.
- 17 Ibid.
- 18 Smart Approaches to Marijuana (SAM). (2020). Lessons Learned from State Marijuana Legalization. Retrieved March 25, 2021, from <https://learnaboutsam.org/wp-content/uploads/2020/12/2020-Impact-Report1.pdf>.
- 19 Troyer, B. (2021, February 15). Marijuana potency must be capped for a safe and healthy Colorado. Retrieved March 26, 2021, from <https://www.denverpost.com/2021/02/15/bob-troyer-marijuana-potency-must-be-capped-for-a-safe-and-healthy-colorado/>

- 20 Di Forti, M., Quattrone, D., Freeman, T. P., Tripoli, G., Gayer-Anderson, C., Quigley, H., Rodriguez, V., Jongsma, H. E., Ferraro, L., La Cascia, C., La Barbera, D., Tarricone, I., Berardi, D., Szöke, A., Arango, C., Tortelli, A., Velthorst, E., Bernardo, M., Del-Ben, C. M., ... van der Ven, E. (2019). The contribution of cannabis use to variation in the incidence of psychotic disorder across Europe (EU-GEI): A multicentre case-control study. *The Lancet Psychiatry*, 6(5), 427–436. [https://doi.org/10.1016/S2215-0366\(19\)30048-3](https://doi.org/10.1016/S2215-0366(19)30048-3)
- 21 Joseph M. Pierre, Michael Gandal, Maya Son, Cannabis-induced psychosis associated with high potency “wax dabs”, *Schizophrenia Research*, Volume 172, Issues 1–3, 2016, Pages 211-212, ISSN 0920-9964, <https://doi.org/10.1016/j.schres.2016.01.056>.
- 22 Substance Abuse and Mental Health Services Administration. (2019). Results from the 2018 National Survey on Drug Use and Health: Detailed tables. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from <https://www.samhsa.gov/data/>
- 23 National Academies of Sciences, Engineering, and Medicine. 2017. The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research. Washington, DC: The National Academies Press. doi: 10.17226/24625.
- 24 Haridy, R. (2020, March 27). Medical marijuana is stronger than it needs to be, study suggests. Retrieved March 25, 2021, from <https://newatlas.com/medical/medical-marijuana-high-thc-too-strong-wake-forest/>
- 25 Freeman, T., Van der Pol, P., Kuijpers, W., Wisselink, J., Das, R., Rigter, S., . . . Lynskey, M. (2018). Changes in cannabis potency and first-time admissions to drug treatment: A 16-year study in the Netherlands. *Psychological Medicine*, 48(14), 2346-2352. doi:10.1017/S0033291717003877
- 26 DutchAmsterdam.nl. (2012, March 22). Dutch government reclassifies high-potency Cannabis. Retrieved March 25, 2021, from <https://www.dutchamsterdam.nl/2065-high-potency-marijuana-hash-reclassified-by-dutch-government>.