

THE NATURAL PROGRESSION OF VAPING TO MARIJUANA TO OPIATE ABUSE:

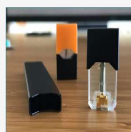
A RECIPE FOR DISASTER!

Goals & Objectives

1. Understand the increased use of vaping, especially among our youth & young adults, and how vaping enhances the levels (bioavailability) of substances causing further difficulties
2. Obtain knowledge about the multiple different substances both legal & illicit that are being abused via vaping
3. Achieve better comprehension on how vaping has been designed & clearly demonstrated to lead to marijuana use/abuse
4. Understand how marijuana use contributes & progresses to opiate/opioid misuse/abuse

E-CIG GENERATIONS

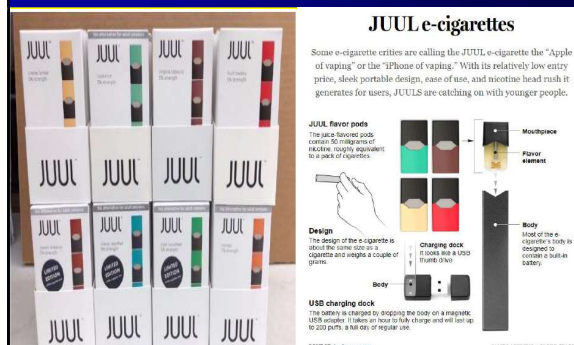
Fifth Generation



- POD MODS
 - "Ultra-portable" = Easy to Conceal
 - Nic-Salts
 - EtOH Content?



JUUL: By Design to Use Cannabis?



PAX Era



The effortless pen-and-pod system for oil. Control temperature, flavor and potency and achieve session predictability. Experience a new era.

Price: \$14.20 for device

SimpleClick™ Pods: 250+ strains and 50+ extract partners means there is a pod for you
Browse Pods for: Strain Type, Desired Effect, Price, Potency, Brand, Terpene Level

Pod Price Range: \$30-39 to \$80-89
<https://www.paxvapor.com/era>

"Hacking the JUUL"

- Instructions on how to "hack"/modify the JUUL device
- For use of JUUL device with DIY juices/cannabis oil
- <https://www.youtube.com/watch?v=5a9NjklJxYE>
- Instructions on YouTube
 - Duration: 90 seconds
- Another YouTube Video with Instructions:
 - Whack it
 - No Bubbles
 - Block the coil for a bigger hit



Vape devices for marijuana and oils



7

<https://adai.uw.edu/marijuana/factsheets/potency.htm>



Disposable marijuana vape pens and cartridges

Delivered to your door by Eaze



8

Source: adai.uw.edu



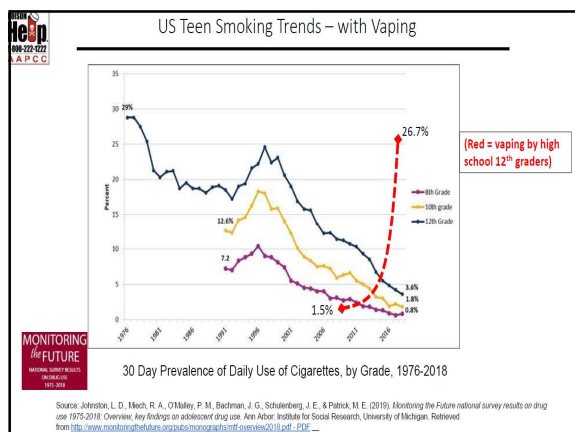
Explosion of Adolescent Vaping

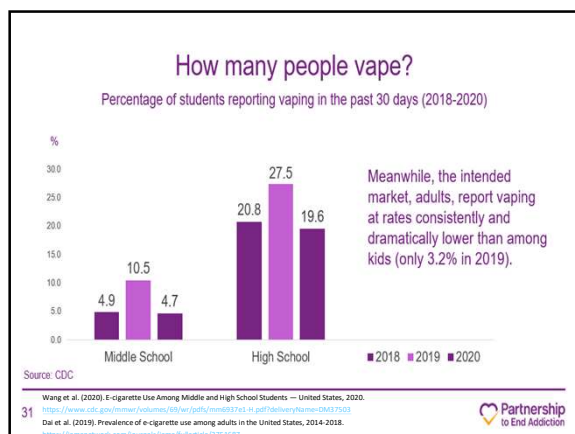
- Number of teens who currently vape **DOUBLED** from 2017 to 2019
- **>40%** of 12th graders and **>20%** of 8th graders have vaped

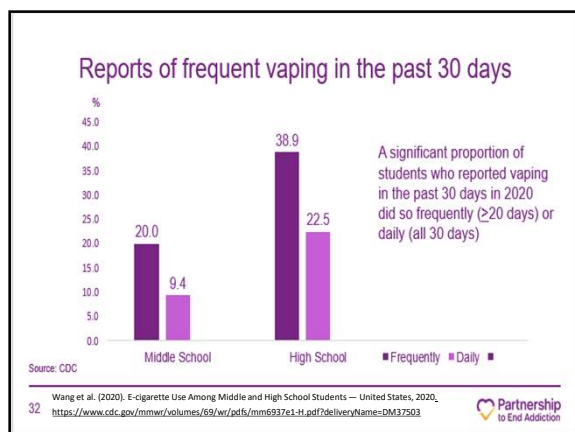
Table 1. Prevalence of Nicotine Vaping among Adolescents, 2017–2019.*

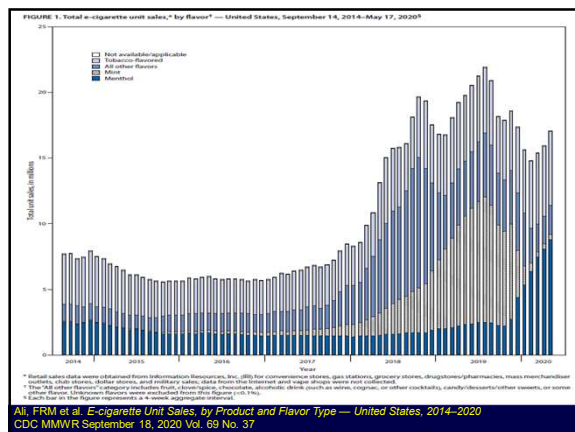
Reporting Interval and Grade in School	Prevalence in 2017 (95% CI)	Prevalence in 2018 (95% CI)	Prevalence in 2019 (95% CI)	Change, 2018 to 2019 (95% CI)
Past 30 days				
12th grade	11.0 (9.2–13.0)	20.9 (17.2–24.3)	25.4 (22.6–28.4)	4.5 (0.9–8.1)
10th grade	8.2 (6.6–10.2)	16.1 (14.0–18.4)	20.2 (17.8–22.8)	4.1 (0.9–7.2)
8th grade	3.5 (2.9–4.2)	6.1 (5.1–7.4)	9.0 (7.6–10.5)	2.8 (1.2–4.4)
Past 12 months				
12th grade	18.8 (16.5–21.4)	29.7 (26.1–33.4)	35.1 (31.8–38.6)	5.4 (1.1–9.6)
10th grade	15.8 (13.6–18.3)	24.7 (21.9–27.7)	31.1 (28.3–34.0)	6.4 (2.7–10.1)
8th grade	7.5 (6.6–8.5)	10.9 (9.4–12.6)	16.1 (14.1–18.2)	5.2 (2.8–7.6)
Ever				
12th grade	25.0 (22.4–27.7)	34.0 (30.3–38.0)	40.5 (37.3–43.8)	6.5 (2.3–10.7)
10th grade	21.4 (19.2–23.9)	28.6 (25.8–31.6)	36.4 (33.5–39.4)	7.7 (4.0–11.5)
8th grade	10.6 (9.5–11.8)	13.5 (11.8–15.3)	20.7 (18.5–23.1)	7.2 (4.6–9.9)

Mitch R et al. Trends in Adolescent Vaping, 2017–2019. N Engl J Med. 2020 Oct 29;383(17):1495-1497.









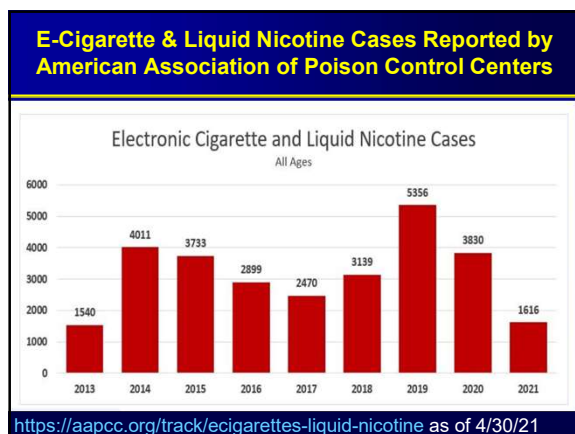
	2017	2018	2019	Increase from 2017 to 2018	P Value	Increase from 2018 to 2019	P Value	Increase from 2017 to 2019*
Year 30†								
No. of 8th graders [‡]	4869	4465	8701					
Prevalence, % (95% CI)	1.6 (1.2–2.1)	2.6 (2.0–3.4)	3.9 (3.3–4.7)	1.0 (0.2–1.7)	.010	1.3 (0.4–2.2)	.006	2.3 (1.5–3.1)
No. of 10th graders	4412	4666	9026					
Prevalence, % (95% CI)	4.3 (3.5–5.3)	4.7 (3.8–5.7)	5.6 (4.7–6.5)	0.7 (1.3–1.1)	<.001	0.9 (0.7–1.5)	<.001	0.8 (0.5–1.0)
No. of 12th graders	4073	4247	8314					
Prevalence, % (95% CI)	5.0 (4.1–6.0)	7.5 (6.2–8.9)	10.6 (12.6–15.5)	2.5 (1.0–4.0)	<.001	6.5 (4.7–8.4)	<.001	9.0 (7.2–10.9)
Part 12								
No. of 8th graders [‡]	4878	4474	8703					
Prevalence, % (95% CI)	3.9 (3.2–4.7)	4.4 (3.6–5.4)	7.0 (6.0–8.2)	1.1 (0.3–2.1)	.009	2.6 (1.3–3.9)	<.001	4.0 (2.7–5.3)
No. of 10th graders	4422	4671	9031					
Prevalence, % (95% CI)	8.1 (6.9–9.4)	12.0 (10.8–13.4)	15.8 (14.7–17.1)	4.2 (2.4–6.3)	<.001	7.0 (6.4–8.2)	<.001	11.3 (9.7–13.0)
No. of 12th graders	4072	4253	8312					
Prevalence, % (95% CI)	9.5 (8.1–11.2)	13.1 (11.4–15.0)	20.8 (19.0–22.9)	4.2 (4.4–7.4)	<.001	7.7 (6.4–10.0) [§]	<.001	11.3 (10.7–13.0)
Urban								
No. of 8th graders [‡]	4907	4507	8747					
Prevalence, % (95% CI)	4.0 (3.4–4.9)	5.5 (4.6–6.7)	9.0 (7.8–10.4)	1.5 (0.3–2.7)	.012	3.5 (2.0–5.0)	<.001	5.0 (3.5–6.5)
No. of 10th graders	4449	4712	9060					
Prevalence, % (95% CI)	9.8 (8.5–11.4)	14.2 (12.6–16.0)	18.9 (18.2–19.4)	4.4 (2.3–6.5)	<.001	7.6 (6.3–9.8)	<.001	12.0 (9.4–14.6)
No. of 12th graders	4044	4303	8365					
Prevalence, % (95% CI)	11.9 (10.2–13.8)	15.6 (13.9–17.4)	23.7 (21.7–25.9)	3.8 (1.5–6.0)	<.001	8.1 (6.7–10.7)	<.001	11.8 (10.0–14.7)
Non-urban								
No. of 8th graders [‡]			8701					
Prevalence, % (95% CI)			1.8 (0.6–3.2)					
No. of 10th graders			9026					
Prevalence, % (95% CI)			1.0 (0.6–1.2)					
No. of 12th graders			8314					
Prevalence, % (95% CI)			3.5 (2.4–4.9)					

* P < .001 for all prevalence increases from 2017 to 2019.

† The sample sizes were unweighted.

‡ One-year prevalence increases from 2018 to 2019 were significantly larger ($P < .05$) than the increase from 2017 to 2018 for all 8th grade and 10th grade outcomes for each 30-day use.

§ This was the first year that 12th grade data was measured (12th grade was defined as 10th grade in 2018 and 2019).



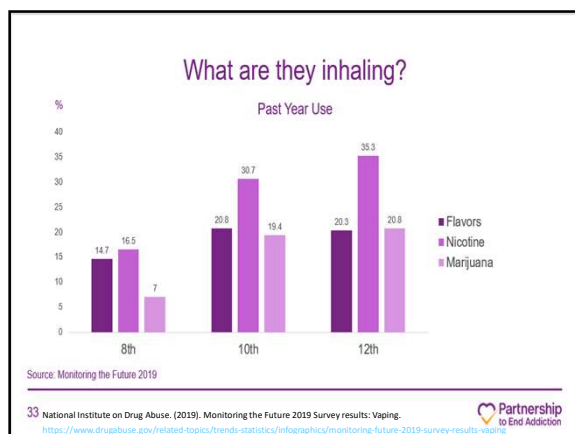
Drugs Other Than Nicotine

- Ethanol*
 - Intoxication without calories
- THC/CBD
 - Hash oil (dabs)
 - Plant material in newer vapes
- Synthetic Cannabinoids
 - Liquid form
- Opioids
- Novel Psychoactive Substances
 - Stimulants
 - Hallucinogens

Results from GDS2017: Which of the following drug have you ever tried to vape? (%)

49.7% (n = 12,302) of last year vapers reported ever trying to vape a drug other than nicotine.

GLOBAL SURVEY 2017



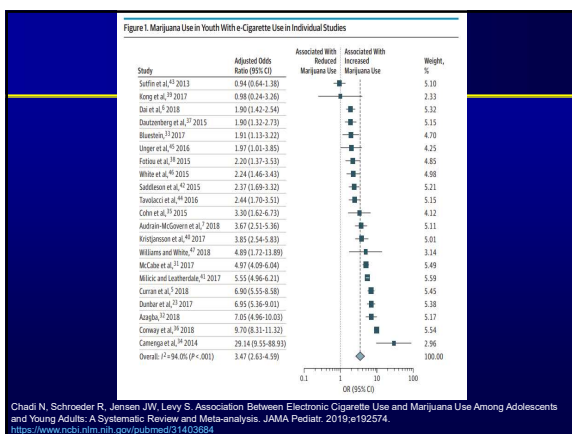
Association Between Electronic Cigarette Use and Marijuana Use Among Adolescents and Young Adults: A Systematic Review and Meta-analysis

Chadi N, Schroeder R, Jensen JW, Levy S. Association Between Electronic Cigarette Use and Marijuana Use Among Adolescents and Young Adults: A Systematic Review and Meta-analysis. JAMA Pediatr. 2019;e192574. <https://www.ncbi.nlm.nih.gov/pubmed/31403684>

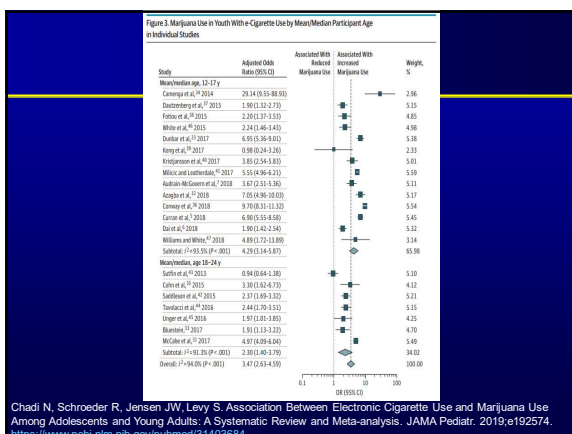
Trial Background

- Of the 835 studies that were reviewed, 21 studies met inclusion criteria
 - Study must include participants between the age of 10-24 y/o
 - Study must compare rates of marijuana use with vs without history of ENDS
 - Study must provide actual or calculable adjusted odds ratios of the association between ENDS use and co-occurring marijuana use or subsequent marijuana use
- All 21 studies were observational studies with 3 studies being longitudinal. A total of 113,863 total patients were represented.

Chadi N, Schroeder R, Jensen JW, Levy S. Association Between Electronic Cigarette Use and Marijuana Use Among Adolescents and Young Adults: A Systematic Review and Meta-analysis. JAMA Pediatr. 2019;e192574. <https://www.ncbi.nlm.nih.gov/pubmed/31403684>



Chadi N, Schroeder R, Jensen JW, Levy S. Association Between Electronic Cigarette Use and Marijuana Use Among Adolescents and Young Adults: A Systematic Review and Meta-analysis. JAMA Pediatr. 2019;e192574. <https://www.ncbi.nlm.nih.gov/pubmed/31403684>



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Trend Results

- Stronger association between ENDS and marijuana use in youth with dual use compared to single use from subgroup analysis
 - Dual use: AOR = 5.93 (95% CI, 3.53-8.24) $I^2=97.6\%$
 - Single use: AOR= 3.10 (95% CI, 2.22-4.34) $I^2=94.6\%$
- Stronger association between ENDS and marijuana use in studies after 2017 compared to studies before 2017
 - After 2017: AOR= 4.57 (95% CI, 3.47-6.03)
 - Before 2017: AOR= 2.39 (95% CI, 1.67-3.40)

Chadi N, Schroeder R, Jensen JW, Levy S. Association Between Electronic Cigarette Use and Marijuana Use Among Adolescents and Young Adults: A Systematic Review and Meta-analysis. *JAMA Pediatr.* 2019;e192574. <https://www.ncbi.nlm.nih.gov/pubmed/31403684>

Acute Effects of Smoking and Vaporizing Cannabis in Healthy Adults Who Infrequently Use Cannabis

IMPORTANCE: Vaporization is an increasingly popular method for cannabis administration, and policy changes have increased adult access to cannabis drastically. Controlled examinations of cannabis vaporization among adults with infrequent current cannabis use patterns (<30 days since last use) are needed.

OBJECTIVE: To evaluate the acute dose effects of smoked and vaporized cannabis using controlled administration methods.

DESIGN, SETTING, AND PARTICIPANTS: This within-participant, double-blind, crossover study was conducted from June 2016 to January 2017 at the Behavioral Pharmacology Research Unit, Johns Hopkins University School of Medicine, and included 17 healthy adults. Six smoked and vaporized outpatient experimental sessions (1-week washout between sessions) were completed in clusters (order counterbalanced across participants); dose order was randomized within each cluster.

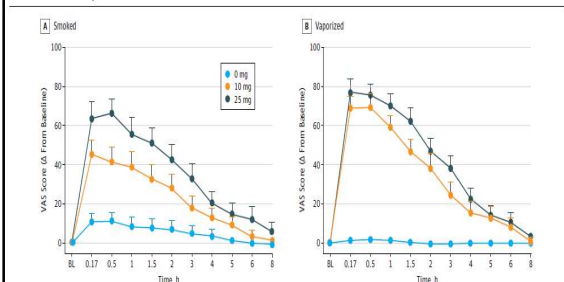
INTERVENTIONS: Cannabis containing Δ^9 -tetrahydrocannabinol (THC) doses of 0 mg, 10 mg, and 25 mg was vaporized and smoked by each participant.

MAIN OUTCOMES AND MEASURES: Change from baseline scores for subjective drug effects, cognitive and psychomotor performance, vital signs, and blood THC concentration.

RESULTS: The sample included 17 healthy adults (mean [SD] age, 27.3 [5.7] years; 9 men and 8 women) with no cannabis use in the prior month (mean [SD] days since last cannabis use, 398 [437] days). Inhalation of cannabis containing 10 mg of THC produced discriminative drug effects (mean [SD] ratings on a 100-point visual analog scale, smoked: 46 [26]; vaporized: 69 [53]) and modest impairment of cognitive functioning. The 25-mg dose produced significant drug effects (mean [SD] ratings, smoked: 66 [29]; vaporized: 78 [24]), increased incidence of adverse effects, and pronounced impairment of cognitive and psychomotor ability (eg, significant decreased task performance compared with placebo in vaporized conditions). Vaporized cannabis resulted in qualitatively stronger drug effects for most pharmacodynamic outcomes and higher peak concentrations of THC in blood, compared with equal doses of smoked cannabis (25-mg dose: smoked, 10.2 ng/mL; vaporized, 14.4 ng/mL). Blood THC concentrations and heart rate peaked within 30 minutes after cannabis administration and returned to baseline within 3 to 4 hours. Several subjective drug effects and observed cognitive and psychomotor impairments persisted for up to 6 hours on average.

Spindle TR, Cone EJ, Schlienz NJ, et al. Acute Effects of Smoked and Vaporized Cannabis in Healthy Adults Who Infrequently Use Cannabis: A Crossover Trial. *JAMA Netw Open.* 2018;1(7):e184841. Published 2018 Nov 2. doi:10.1001/jamanetworkopen.2018.4841 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6324364/>

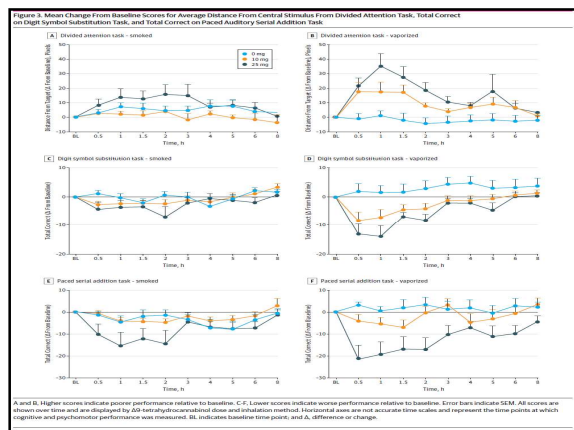
Figure 2. Mean Ratings for Visual Analog Scale (VAS) Item Drug Effect From the Drug Effect Questionnaire Displayed Over Time and Across Δ^9 -Tetrahydrocannabinol Dose for Smoked and Vaporized Conditions



Scores ranged from 0 (not at all) to 100 (extremely). Error bars indicate SEM. Horizontal axes are not accurate time scales and represent the time points at which subjective drug effects were assessed. BL indicates baseline time point, and Δ, difference or change.

JAMA Network Open. 2018;1(7):e184841. doi:10.1001/jamanetworkopen.2018.4841

November 30, 2018 9/14

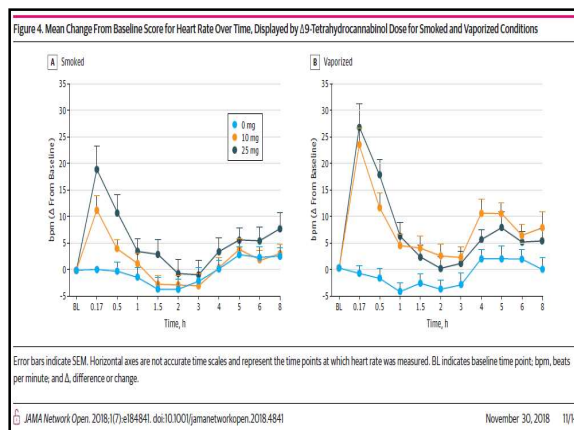


Amount: THC 25mg = 13.4% THC

In the 30 days prior to enrollment. After inhaling smoked and vaporized cannabis containing 25 mg of THC, participants experienced pronounced drug effects, substantial impairment of cognitive and psychomotor functioning, and marked increases in HR. Notably, the highest dose of cannabis administered in this study (25 mg of THC; 0.19 g; 13.4% THC) is substantially smaller and has a lower THC concentration than what is typically contained in prerolled cannabis cigarettes available for purchase in cannabis dispensaries, which commonly contain roughly 1.0 g of cannabis with THC concentrations often exceeding 18%.²⁸ Thus, individuals who initiate cannabis use can readily access products that contain far greater amounts of cannabis, with higher THC concentrations, than administered in this study. Regulatory and clinical entities should consider these results in decisions

involving cannabis accessibility, dosing recommendations, and education for novice cannabis users.

Spindle TR, Cone EJ, Schlienz NJ, et al. Acute Effects of Smoked and Vaporized Cannabis in Healthy Adults Who Infrequently Use Cannabis: A Crossover Trial. *JAMA Netw Open*. 2018;1(7):e184841. Published 2018 Nov 2. doi:10.1001/jamanetworkopen.2018.4841. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6324384/>



Vaped vs. Smoked Marijuana

- Level of THC in marijuana vapes can be far higher
- Vaped marijuana tends to be much more potent than smoked marijuana

Vaping Guide for Health Care Professionals, P.8, drugfree.org

Heroin Vapes?!

TKO




Heroin-Laced Vape Pens
 Intelligence Dissemination Report
Regional Operations & Intelligence Center (ROIC)
 Office of Drug Monitoring & Analysis – ROIC201912-180910
 NJ ROIC SEN, NJ CHM (LAW) (Longmire)/JTOO (TKO, HSC, JLT) (Officer Operations)
 8 November 2019

Key Findings:
Vape pens laced with heroin identified in overdose incidents.

Details:
On October 31, 2019, in separate incidents, two high school students in Morgantown, WV overdosed on suspected heroin-laced vape pens.

- Additional overdose incidents occurred at a neighboring high school.

Vape pen branded “TKO” tested positive for flubronazepam, heroin, magnesium chloride, and sodium nitrate.



Recommendations for School Officials:
To avoid exposure to controlled dangerous substances, officials should:

- Use gloves when handling the device and/or cartridge.
- Confiscate the device along with the cartridge.
- Contact your school resource officer or local police department to hand over evidence.
- Provide awareness to students and parents concerning the evolving dangers surrounding vape pens.

Source: Law Enforcement

Source Reliability: Completely Reliable

Contributing Agency: Appalachia HIDTA

Dissemination: For Official Use Only Partners

Request for Information and Contact Information: Any agency with additional information regarding this topic, or with questions about this product, may contact the Drug Monitoring Initiative (DMI), Office of Drug Monitoring & Analysis at (609) 536-3661, or DMI@zw.nj.gov.

Marijuana Negative Effects

- Impaired attention, learning, problem-solving skills, memory and other cognitive functions
- Impaired reaction time and coordination, especially related to driving
- Academic or job difficulties, school dropout
- Increased risk of mental health issues including depression, anxiety and, in some cases, psychosis and suicidal thoughts
- **Marijuana use disorder (addiction) and other substance use and addiction**

Vaping Guide for Health Care Professionals, P.8. drugfree.org

Teen Cannabis Use Tied to Harmful Substance Use Later

- Teens who use cannabis even occasionally are more likely to misuse other drugs & alcohol in early adulthood
- Over 5300 U.K. adolescents answered questions on cannabis use several times between ages 13 & 18 and then were followed up at age 21
 - 80% were cannabis nonusers as teens
 - 17% were occasional users
 - 3% were regular users (at least once weekly)
- After adjustment for demographics, conduct problems, early alcohol & tobacco use, cannabis use in adolescence was associated with harmful substance use later

Taylor M, Collin SM, Munafò MR, et al. Patterns of cannabis use during adolescence and their association with harmful substance use behaviour: findings from a UK birth cohort. J Epidemiol Community Health Published Online First: 07 June 2017 doi: 10.1136/jech-2016-208503

Teen Cannabis Use Tied to Harmful Substance Use Later

Substance use rates at age 21 according to teen cannabis use were:

- Nicotine dependence:
 - 1% of cannabis nonusers
 - 5% of occasional users
 - 21% of regular users
- Harmful alcohol consumption
 - 8% of cannabis nonusers
 - 28%–43% of occasional users
 - 24% of regular users
- Other illicit drug use
 - 14% of cannabis nonusers
 - 83% of occasional users
 - 94% of regular users
- **Conclusion** 'One-fifth' of the adolescents in our sample followed a pattern of occasional or regular cannabis use, and these young people were more likely to progress to harmful substance use behaviours in early adulthood.

Taylor M, Collin SM, Munafò MR, et al. Patterns of cannabis use during adolescence and their association with harmful substance use behaviour: findings from a UK birth cohort. J Epidemiol Community Health Published Online First: 07 June 2017 doi: 10.1136/jech-2016-208503

Prenatal Cannabis Exposure Increases Heroin Seeking in Adults Rats

- THC exposed rats exhibited shorter latency to the first active lever press for heroin
- Had higher heroin seeking during mild stress & drug extinction than animals not exposed to THC
- Exhibited allostatic changes in limbic enkephalin systems in adulthood

Sapiano et al. Biol Psychiatry 2007;61:554-556

Prenatal Exposure of Cannabis Alters Opioid Gene Function in Humans

- Aborted fetus brains from women using marijuana compared to those from women not using marijuana during pregnancy
- Discovered **impaired opioid-related genes** in distinct brain circuits
- May have long term effects on cognitive & emotional behaviors



Wang et al. Pharmacogenomics J, 2006;6:255-264

Cannabis Use and Risk of Prescription Opioid Use Disorder in the United States

Mark Olfson, M.D., M.P.H., Melanie M. Wall, Ph.D., Shang-Min Liu, M.S., Carlos Blanco, M.D., Ph.D.

Objective: The authors sought to determine whether cannabis use is associated with a change in the risk of incident nonmedical prescription opioid use and opioid use disorder at 3-year follow-up.

Method: The authors used logistic regression models to assess prospective associations between cannabis use at wave 1 (2001–2002) and nonmedical prescription opioid use and prescription opioid use disorder at wave 2 (2004–2005) of the National Epidemiologic Survey on Alcohol and Related Conditions. Corresponding analyses were performed among adults with moderate or more severe pain and with non-medical opioid use at wave 1. Cannabis and prescription opioid use were measured with a structured interview (the Alcohol Use Disorder and Associated Disabilities Interview Schedule—DSM-IV version). Other covariates included age, sex, race/ethnicity, anxiety or mood disorders, family history of drug, alcohol, and behavioral problems, and, in opioid use disorder analyses, nonmedical opioid use.

Results: In logistic regression models, cannabis use at wave 1 was associated with increased incident nonmedical prescription

opioid use (odds ratio=5.78, 95% CI=4.23–7.90) and opioid use disorder (odds ratio=7.76, 95% CI=4.95–12.16) at wave 2. These associations remained significant after adjustment for background characteristics (nonmedical opioid use: adjusted odds ratio=2.62, 95% CI=1.86–3.69; opioid use disorder: adjusted odds ratio=2.18, 95% CI=1.14–4.14). Among adults with pain at wave 1, cannabis use was also associated with increased incident nonmedical opioid use (adjusted odds ratio=2.99, 95% CI=1.63–5.47) at wave 2; it was also associated with increased incident prescription opioid use disorder, although the association fell short of significance (adjusted odds ratio=2.14, 95% CI=0.95–4.83). Among adults with nonmedical opioid use at wave 1, cannabis use was also associated with an increase in nonmedical opioid use (adjusted odds ratio=3.13, 95% CI=1.19–8.23).

Conclusions: Cannabis use appears to increase rather than decrease the risk of developing nonmedical prescription opioid use and opioid use disorder.

AJP in Advance |doi: 10.1176/appi.ajp.2017.17040413|

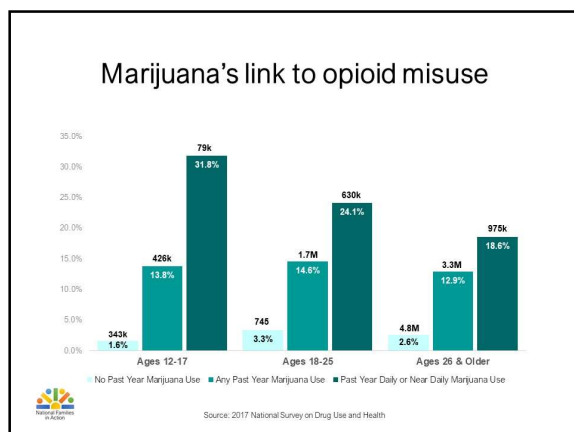
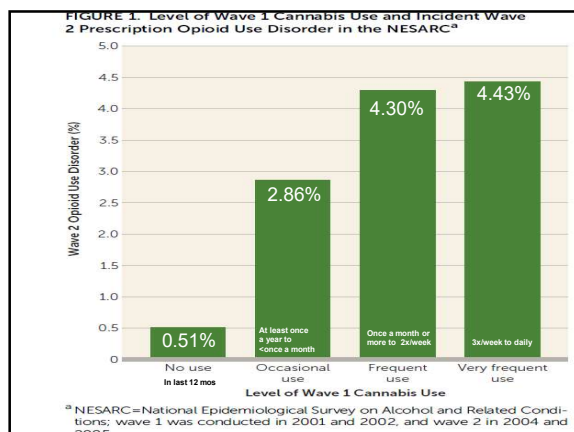


Table 1. Prevalence of Specific Substance Use Disorders Among Individuals With Lifetime Substance Use Aged 12 to 25 Years by the Time Since Last Substance Use^a

Substance Use Disorder	Age Group	Time Since Last Substance Use	Prevalence (%)	95% CI	P-value
Alcohol use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA
Tobacco use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA
Cocaine use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA
Heroin use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA
Marijuana use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA
Opioid use disorder	12-17 y	Never	1.1	0.8-1.5	NA
		1-11 mo	1.1	0.8-1.5	NA
		12-23 mo	1.1	0.8-1.5	NA
		24-35 mo	1.1	0.8-1.5	NA

^a Data from 2012 to 2018 National Survey on Drug Use and Health (NSDUH).
^b Prevalence estimates for age, sex, race/ethnicity, and family structure are adjusted for each other.
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^y Prevalence estimates for age, sex, race/ethnicity, and family structure are adjusted for each other.
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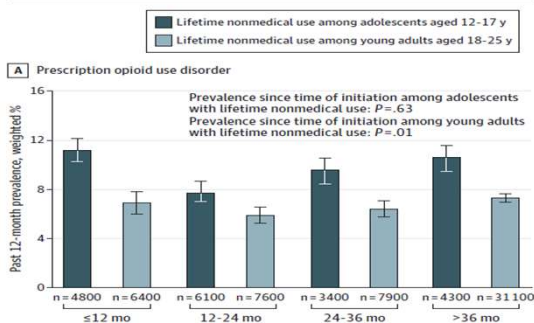
Volkow ND, et al. Prevalence of Substance Use Disorders by Time Since First Substance Use Among Young People in the US. Research Letter JAMA Pediatrics. March 20, 2021

Prevalence of Substance Use Disorders by Time Since First Substance Use Among Young People in the US

- Earlier age at drug initiation has been shown to be associated with faster transition to substance use disorder (SUD)¹
- Prevalence of lifetime substance use among adolescents in 2018 was
 - 26.3% (95% CI, 25.4-27.2) for alcohol
 - 15.4% (95% CI, 14.7-16.1) for cannabis
 - 13.4% (95% CI, 12.7-14.1) for tobacco
- Prevalence of lifetime substance use among young adults in 2018 was
 - 79.7% (95%CI, 78.9- 80.5) for alcohol
 - 51.5% (95%CI, 50.4-52.6) for cannabis
 - 55.0% (95%CI, 53.9-56.1) for tobacco
- Adjusted prevalence of cannabis use disorder was higher among adolescents than among young adults
 - within 12 months of initiation (10.7%; 95%CI, 9.3-12.3 vs. 6.4%; 95%CI, 5.2-7.9)
 - at more than 36 months (20.1% [95%CI, 18.0 - 22.3] vs. 10.9% [95% CI, 10.3-11.4])

Volkow ND, et al. Prevalence of Substance Use Disorders by Time Since First Substance Use Among Young People in the US. Research Letter JAMA Pediatrics. March 29, 2021

Figure. Adjusted Past 12-Month Prevalence of Prescription Drug Use Disorder by Time Since First Nonmedical Use



Volkow ND, et al. Prevalence of Substance Use Disorders by Time Since First Substance Use Among Young People in the US. Research Letter JAMA Pediatrics. March 29, 2021

Naltrexone Maintenance Decreases Cannabis Self Administration & Subjective Effects of Daily Cannabis Use

- Randomized double-blind placebo controlled trial of naltrexone in non-treatment seeking cannabis smokers
- In a laboratory setting those receiving placebo had 7.6x the odds of self administering active cannabis compared with those receiving naltrexone daily
- Decreased marijuana use with naltrexone

Haney et al. Neuropsychopharmacology 2015.

Vaping Leads To...

MARIJUANA

FIRST,

OPIATES/OPIOIDS

LAST!

Heroin use is part of a larger substance abuse problem.

Nearly all people who used heroin also used at least 1 other drug.

Most used at least **3** other drugs.

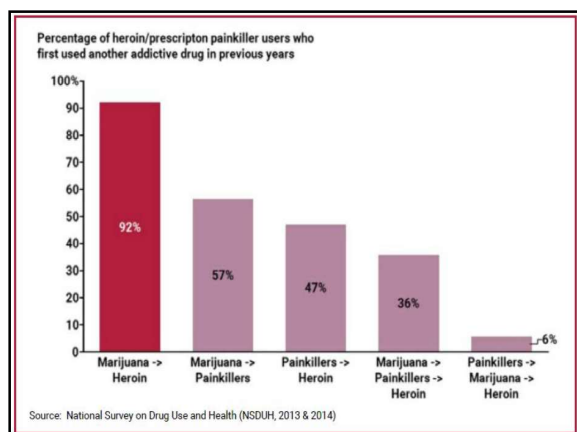
Heroin is a highly addictive opioid drug with a high risk of overdose and death for users.

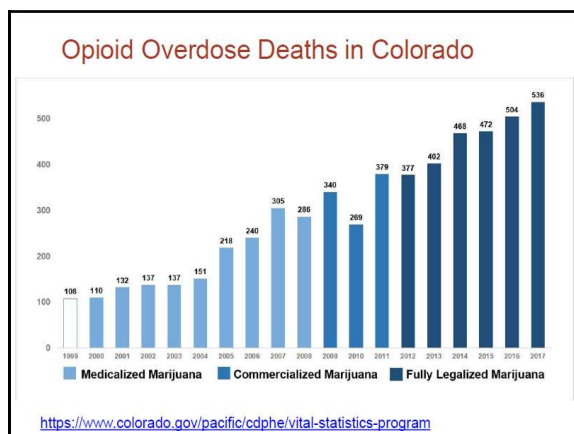
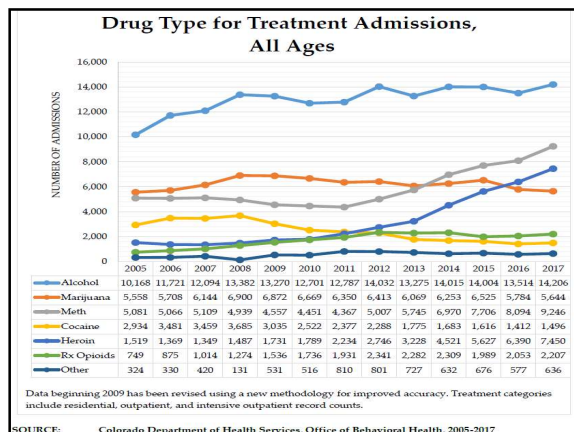
People who are addicted to...

ALCOHOL	MARIJUANA	COCAINE	Rx OPIOID PAINKILLERS
are	are	are	are
2x	3x	15x	40x

...more likely to be addicted to heroin.

SOURCE: National Survey on Drug Use and Health (NSDUH), 2011-2013.





Association Between Medical Cannabis Laws and Opioid Overdose Mortality Has Reversed Over Time

Medical cannabis has been touted as a solution to the US opioid overdose crisis since Bachhuber et al. (M. A. Bachhuber, B. Saloner, C. O. Cunningham, C. L. Barry, *JAMA Intern. Med.* 174, 1668-1675) found that from 1999 to 2010 states with medical cannabis laws experienced slower increases in opioid analgesic overdose mortality. That research received substantial attention in the scientific literature and popular press and served as a talking point for the cannabis industry and its advocates, despite caveats from the authors and others to exercise caution when using ecological correlations to draw causal, individual-level conclusions. In this study, we used the same methods to extend Bachhuber et al.'s analysis through 2017. Not only did findings from the original analysis not hold over the longer period, but the association between state medical cannabis laws and opioid overdose mortality reversed direction from -21% to +23% and remained positive after accounting for recreational cannabis laws. We also uncovered no evidence that either broader (recreationally or more restrictive [low-tetrahydrocannabinol] cannabis laws were associated with changes in opioid overdose mortality. We find it unlikely that medical cannabis—used by about 2.5% of the US population—has exerted large conflicting effects on opioid overdose mortality. A more plausible interpretation is that this association is spurious. Moreover, if such relationships do exist, they cannot be rigorously discerned with aggregate data. Research into therapeutic potential of cannabis should continue, but the claim that enacting medical cannabis laws will reduce opioid overdose death should be met with skepticism.

Shover CL, Davis CS, Gordon SC, Humphreys K. Association between medical cannabis laws and opioid overdose mortality has reversed over time. *Proc Natl Acad Sci USA.* 2019;116(26):12624-12628. <https://www.ncbi.nlm.nih.gov/pubmed/31182592>

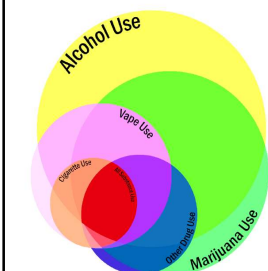
"In this study, we used the same methods to extend Bachhuber et al.'s analysis through 2017. Not only did findings from the original analysis not hold over the longer period, but the association between state medical cannabis laws and opioid overdose mortality reversed direction from -21% to +23% and remained positive after accounting for recreational cannabis laws."

Number of pediatric patients...

- Testing positive for opioid addiction or dependency in the US Emergency Rooms increased from 32,235 in 2008 to 49,626 in 2013
- With 2013 data, 135 patients 21 years of age or younger tested positive for opioid addiction or dependency EVERY DAY in our country's emergency rooms.
- 135 pediatric patients per day
- 92% did not have any chronic co-morbid condition
- A pediatric public health crisis

Allareddy, V. et al. Opioid Abuse in Children: An Emerging Public Health Crisis. American Academy of Pediatrics 2017 National Conference. 9/15/17

Polysubstance use among 11th grade students



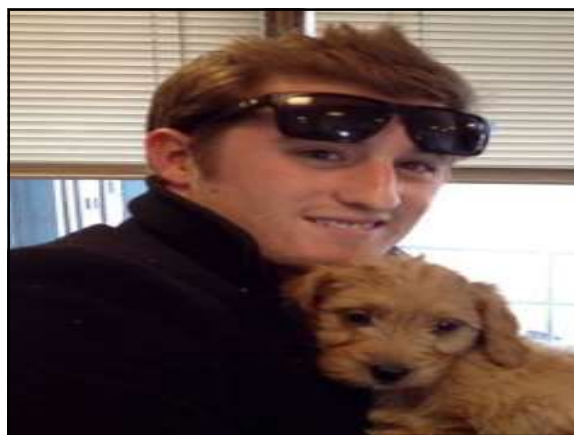
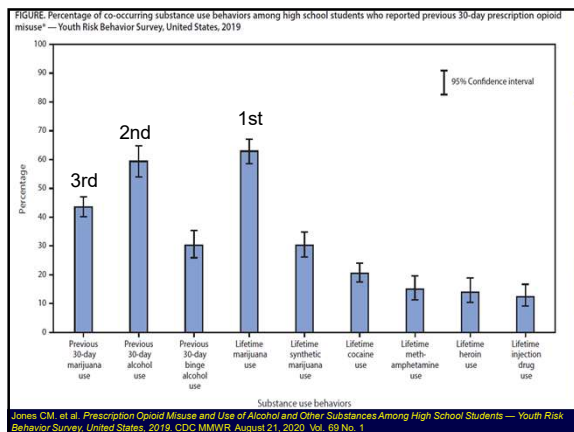
This Venn diagram illustrates the prevalence of past year polysubstance use among 11th grade students in Delaware. Each circle has been scaled relative to the number of students who report using that substance in the past year, and the areas where circles overlap are accurate to the proportion of students who reported using multiple substances. Overall, 55% of students report using at least one substance in the past year, meaning that 45% of students did not report past year substance use.

As in previous years, alcohol remains the most commonly used substance, with marijuana as the second most used substance. Most students who reported using a different substance were also using alcohol or marijuana (if not both). Also of note, every student who reported smoking cigarettes also reported the use of an e-cigarette or vaping device. Two percent of students reported using substances from all five categories of drugs listed.

Substance	% reporting past year use
Alcohol	45%
Marijuana	34%
E-cigarette/Vape	17%
Cigarettes	7%
At least one other drug*	12%
All of the above categories	2%

Note: *This includes ecstasy, hallucinogens, steroids, over-the-counter drugs, amphetamines, crack, cocaine, heroin, synthetic marijuana, and/or any prescription medication used in ways other than prescribed.

Source: "2018 Delaware School Survey," Center for Drug and Health Studies, University of Delaware.



Contact Information

William.Lynch2@jefferson.edu

williamjlynchjr@yahoo.com