


# MAINE AAP

## The Starts and Stops of Vaping

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# May 20th, 2021

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## Maine 2018

### The New York Times

#### *'I Can't Stop': Schools Struggle With Vaping Explosion*

By Kate Zernike  
April 2, 2018

The student had been caught vaping in school three times before he sat in the vice principal's office at Cape Elizabeth High School in Maine this winter and shamefacedly admitted what by then was obvious.

"I can't stop," he told the vice principal, Nate Carpenter.

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## Current Maine Statistics MIYHS 2019 Data

Current use for high schoolers and middle schoolers **doubled** from 2017 to 2019

- 15% to 29%
- 3.8% to 7%



Awareness is increasing for high school students regarding nicotine content

- 25% aware in 2017
- 56% aware in 2019

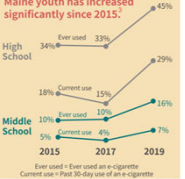
Most students who vape borrow e-cigarettes or get someone else to buy them

Maine Integrated Youth Health Survey, 2019

**E-cigarette use by Maine youth:**


-  **1 in 2** (45%) high school students & middle school students
-  **1 in 6** (16%) middle school students have **ever used** e-cigarettes.

**E-cigarette use among Maine youth has increased significantly since 2015.<sup>1</sup>**



Ever used = Ever used an e-cigarette. Current use = Past 30-day use of an e-cigarette.

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## National Data – CDC National Youth Tobacco Survey

**E-cigarette use<sup>1</sup> increased from 2017 to 2019**

- High school: 11.7% to 27.5% (**↑135%**)
- Middle school: 3.3% to 10.5%

**Slight decrease in 2020**


- High school: 19.6%
- Middle school: 4.7%

**However, increasing proportion in heavier use in 2020**

- Reported use on 20 of preceding 30 days
- High school: from 34.2% to **39.9%**
- Middle school: from 18% to **20%**
- Report daily use
- High school: **22.5%**
- Middle school: **9.4%**

1) Use of an e-cigarette within last 30 days

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## What are these...e-cigarettes?

Obviously, we need to stay informed if we are recommending these!

(Disclaimer: this is a joke) - Stanford University Research Into The Impact of Tobacco Advertising

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## Electronic Nicotine Delivery Systems

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## Pod Based

Most popular choice with adolescents

Disposable or refillable cartridges  
 Uses nicotine salts in benzoic acid to deliver high concentrations of nicotine  
 1 JUUL pod = 40 mg of nicotine

**This is equivalent to 1 pack of cigarettes.**

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## Other Ingredients

**Propylene glycol:** common food additive, also used in antifreeze, paint solvent, and artificial smoke  
**Carcinogens:** e.g. acetaldehyde and formaldehyde  
**Acrolein:** herbicide, irreversible lung damage  
**Diacyl:** "popcorn worker's lung"  
**Heavy metals:** nickel, tin, lead  
**Cadmium:** toxic metal  
**Benzene:** volatile organic compound found in car exhaust  
**Ultrafine particles** that can be inhaled deep into the lungs

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## E-Liquid- Nicotine

*Nicotiana tabacum* – derived from the nightshade family

**Highly addictive** – arguably exceeds all other forms of addiction worldwide

Within 8-20 seconds of being inhaled, nicotine reaches the brain

Metabolized by the liver into cotinine

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## Adolescent Brain

2017 study demonstrated adolescents using e-cigarettes are 3.6 times more likely to use combustible cigarettes<sup>1</sup>

Almost 90% adult smokers start before age 18 yrs<sup>2</sup>

Adolescent neural maturation defined by experience-dependent plasticity<sup>3</sup>

- Nicotine alters pathways in prefrontal cortex
- Can irreversibly alter regulation of cognition and emotion

Teens addicted to nicotine are more likely to<sup>3</sup>

- Have diminished cognitive function as adults
- Reduced attention spans as adults
- Enhanced impulsivity as adults
- Experience depression in adulthood
- Use other drugs
- Engage in high-risk sexual behavior
- Develop psychiatric disorders

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## Use to Dependency- UCSF/Stanford study Looking at ENDS 2/2019

- 173 (13-18yo) mean 16.6 - 10 lifetime uses ENDS
- 80.3% still using 12 months later
- Daily use 14.5% at beginning- 29.8% after 12 months
- Only ENDS at start- 28.8% also using combustibles
- Dependence scores at baseline 13.3 %- at end increased 23.3%
- Dependence scores and cotinine levels increased over time.
- The ~ 20% who quit-desire for self- improvement: difficulty/cost maintaining device: getting in too much trouble.

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## Assessing Nicotine Addiction from E-Cigarettes

EASI- E- Cigarette Addiction Severity Index

Hooked on Nicotine

Penn State E-Cigarette Dependence Index

PROMIS Patient Reported Outcome Information System

CRAFFT, DAST, AUDIT, PHQ-9, AC-OK,

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## Nicotine Dependence and Mental Health

**Strong Association with anxiety and depression**

- ❖ Longitudinal relationship unclear
- ❖ Anxiety disorders tend to ultimately increase dependence on nicotine
- ❖ Smokers with depression fail to quit 2 times as often as those with out depression
- ❖ Smoking in adolescence increases risk of developing depression 3-4 times in adulthood

**ADHD higher rates of cigarette use in this group - lifetime prevalence of smoking in pts 40% versus 19% of those without ADHD**

Kutlu MG, Parikh V, Gould TJ. Nicotine Addiction and Psychiatric Disorders. *Int Rev Neurobiol.* 2015;124:171-208. doi: 10.1016/bs.irn.2015.08.004. Epub 2015 Sep 19. PMID: 26472530; PMCID: PMC5755398.

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## Other Substance Use

**Nicotine Use in adolescents increases odds co-occurring alcohol and marijuana use.**

- ❖ Meta analysis 2020 *Addiction Behavior* Herschberger *et al.* 19 studies combined data; 13.6 years to 18 years; 150,299 participants; 51.8% female. Youth reporting ENDS use 4.5 greater odds of reporting alcohol use versus those that did not report ends use. Did not vary by current or lifetime ENDS use; reported 4.51 greater odds binge drinking.
- ❖ 14 Studies, 89,962 participants 51.8% female; 13.6-18 years of age. Youth reporting ENDS use had 6.04 increased odds of reporting marijuana use; did not vary by current or lifetime ENDS use.

**Nicotine Use in adolescents increases risk of future substance use disorders.**

Hershberger A, Argyriou E, Cyders M. Electronic nicotine delivery system use is related to higher odds of alcohol and marijuana use in adolescents: Meta-analytic evidence. *Addict Behav.* 2020 Jun;105:106325. doi: 10.1016/j.addbeh.2020.106325. Epub 2020 Jan 27. PMID: 32092474; PMCID: PMC7197053.

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## Behavioral Support

- Self Help Materials (better than nothing)
- Web Based Supports- Interactive Tailored Best Modest Increase In success of quitting in Adults / May provide some additional support in motivated youth .
- Mobile Apps using text messages in adults increased abstinence at 6 months in adults – studies in youth inconclusive.
- Intensive Behavioral Counseling Increases Success of Quit attempt; More intensive the therapy; likely better. Not sure how much is “best”.
- Groups and multimodal approaches showed most promise for helping youth .
- Maine QuitLink 1-800- Quit- NOW
- Text Maine 88709 [Truth Initiative]

Fanshawe TR, Halliwell W, Lindson N, Aveyard P, Livingstone-Banks J, Hartmann-Boyce J. Tobacco cessation interventions for young people. *Cochrane Database of Systematic Reviews* 2017, Issue 11. Art. No.: CD003289. DOI: 10.1002/14651858.CD003289.pub6

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## Medication for Nicotine Use Disorder

- Comes from smoking cessation literature
- Meta-analysis 1188 adolescent smokers 12- 20 years of age /9 RCT/627 intervention 561 in control
  - RR Abstinence at 4 weeks 1.62 in intervention with medication versus control
  - RR higher for abstinence versus control at 8 /12/24 weeks but not significant
  - Bupropion trials most notable –intervention 300mg/d x6 weeks
- Adherence to medication substantially improves success

Myung SK, Park JY. Efficacy of Pharmacotherapy for Smoking Cessation in Adolescent Smokers: A Meta-analysis of Randomized Controlled Trials. *Nicotine Tob Res.* 2019 Oct 26;21(11):1473-1479. doi: 10.1093/ntr/nty180. PMID: 30165705.

Leischow SJ, Muramoto ML, Matthews E, Floden LL, Grana RA. Adolescent Smoking Cessation With Bupropion: The Role of Adherence. *Nicotine Tob Res.* 2015 May;18(5):1202-5. doi: 10.1093/ntr/ntv179. Epub 2015 Nov 13. PMID: 26567274; PMCID: PMC5896821.

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## Medication- FDA approved for 18 and over- Studies in youth with combustibles

Bupropion 150 bid with behavioral therapy (Contingency management) - Contra indicated in youth with seizures/eating disorders / complex alcohol use.

Varenicline-superior for adults few trials in youth with suggestion of early cessation promotion but not prolonged effect. FDA changed labeling to make clear not recommended in patients less than 16 years of age. No effect in this younger group.

Squeglia LM, Fadius MC, McClure EA, Tomko RL, Gray KM. Pharmacological Treatment of Youth Substance Use Disorders. J Child Adolesc Psychopharmacol. 2019 Aug;29(7):559-572. doi: 10.1089/cap.2019.0009. Epub 2019 Apr 22. PMID: 31009234; PMCID: PMC6727439.

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## How much Nicotine are we trying to Replace?

Combustible Cigarettes Avg price = \$ 7.61*	Contain 8-9 mg nicotine per cigarette and delivers about 1-1.5 mg to blood stream	1 ppd Smoker may have about 20-32 mg of nicotine delivered to blood stream per day
Juul 4 Menthol Pods \$15.99	Reports Nicotine Concentration by Weight 5% Nicotine = 59 mg/ml	5% pod=7 ml= 41mg nicotine Provides about 200 puffs
Most other e-liquids Cost Varies \$4.95-11.95( disposables)	Nicotine concentration reported by volume 5%= 50 mg/ml 2%=20mg/ml	Especially with disposables Concentration and tank size Puff size has 1.3ml- 300 puffs Kanga Vape slick Plus 4 ml 1200 Puffs

\*Tobacco Free Kids  
Benowitz N. Nicotine Addiction. N Engl J Med. 2010 Jun 17; 362(24): 2295-2303. doi: 10.1056/NEJMra0809890

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## A Tapering Regimen Guide

Tapering regimen for a patient with high nicotine dependence with 21mg patch and as needed 2mg lozenges  
Patch is strength/24 hours. Lozenges are in pieces per day.

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Prev. Med. 2017 Apr;97:45-49

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## NRT


- If Under the age of 18 need a physician prescription and may not be covered by insurance.
- \$42-56 for 2 weeks 21 mg patches at retailers/ \$40 for 28 21mg patch ordered on-line
- 20 pieces 2-4 mg gum \$18/ 160-170 pieces for \$57 at retailers
- Frequent check in is helpful
- School polices for gum use may need adjustment

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## How to think about the process

1. Think about **HARM REDUCTION**
2. Whole patient assessment- youth with mood disorders will have a harder time giving up nicotine.
3. Set a quit date.
4. Encourage behavioral support.
5. Can you bring in the family?
6. Educate about anticipated course [especially if using NRT] and plan for follow up. It may be a bumpy ride.
7. Text Maine to 88709
8. Call the Maine QuitLink 1-800-Quit-Now.



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## Resources

**Hooked on Nicotine Checklist:**  
[https://www.umassmed.edu/globalassets/attocpenn/the\\_hooked\\_on\\_nicotine\\_checklist.pdf?\\_t\\_id=1B2M2Y8AsgTpgAmY7PhCfg%3D%3D&\\_t\\_q=HONC&\\_t\\_tags=language%3A%-](https://www.umassmed.edu/globalassets/attocpenn/the_hooked_on_nicotine_checklist.pdf?_t_id=1B2M2Y8AsgTpgAmY7PhCfg%3D%3D&_t_q=HONC&_t_tags=language%3A%-)

**Penn State e-Cigarette Dependence Scale:**  
<https://research.med.psu.edu/smoking/dependence-index/>

**Julius Richmond Center AAP – Tobacco Prevention Treatment Advocacy:**  
<https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Richmond-Center/Pages/default.aspx>



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## Vaping Support Services

**Vaping Quit Support Line**  
 1-844-9NO-VAPE  
[NoVape@MaineQuitlink.com](mailto:NoVape@MaineQuitlink.com)

**Youth Texting Program**  
 Text Maine to 88709

**Live Vape Free**  
 Online Course for parents and concerned adults

**Website geared toward Youth**  
<https://vapefreemaine.com>

**Maine Quit Link**  
<https://mainequitlink.com/vaping-quit-support>



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## Sources

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- 1) <https://preventionforme.org>
- 2) <http://smokingcessationleadership.ucsf.ed>
- 3) <http://www.tobaccofreekids.org>
- 4) <http://www.cdc.gov/tobacco>
- 5) <https://truthinitiative.org>
- 6) <http://www.smokefree.gov>
- 7) <https://services.aap.org/en/learning/e-cigarette-curriculum/>



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