

Behavioral Health &  
Wellness Program

# ENDS & Associated Criminogenic Risk Factors

Jim Pavlik, MA, CTPP

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School of Medicine

UNIVERSITY OF COLORADO  
ANSCHUTZ MEDICAL CAMPUS



**Define**

Electronic Nicotine Delivery Systems (ENDS)



**Discuss**

common and important data gaps



**Describe**

recent shifts in ENDS use



**Present**

several factors known to be associated with incarceration and which have been recently associated to ENDS use

# Disclosure

I have no conflicts of interest, financial or otherwise, to disclose.

Opinions, speculations, predictions are my own and not necessarily shared by BHWP, the University of Colorado, or any division or department of the State of Arizona including the Department of Health Services.



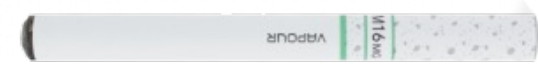
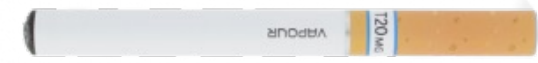




# Defining ENDS

# Distinguishing Factors of ENDS Products

Types of ENDS	Distinguishing Factors
Electronic cigarettes (e-cigarettes) Cigalikes	<ul style="list-style-type: none"> <li>• Physically similar to cigarettes</li> <li>• Come in disposable or refillable/rechargeable forms</li> <li>• Some emit a light when the user puffs</li> <li>• Relatively short battery life</li> <li>• Relatively less efficient nicotine delivery</li> </ul>
Vaporizer (or vape) pen	<ul style="list-style-type: none"> <li>• Come in various sizes, does not resemble a cigarette</li> <li>• Comes in disposable or rechargeable forms</li> <li>• Slim like a pen</li> <li>• Can be modified</li> </ul>
Modifiable systems Advanced personal vaporizers (MODs)	<ul style="list-style-type: none"> <li>• Larger device</li> <li>• Most are rechargeable</li> <li>• Can be modified</li> <li>• Larger batteries</li> <li>• Relatively more efficient nicotine delivery</li> </ul>
Electronic water pipe/hookah	<ul style="list-style-type: none"> <li>• Electronic versions of traditional water pipe/hookah</li> <li>• Relatively less efficient nicotine delivery</li> </ul>
Pod-based products (e.g., JUUL)	<ul style="list-style-type: none"> <li>• Look like a piece of tech</li> <li>• The "iPhone of e-cigarettes"</li> </ul>

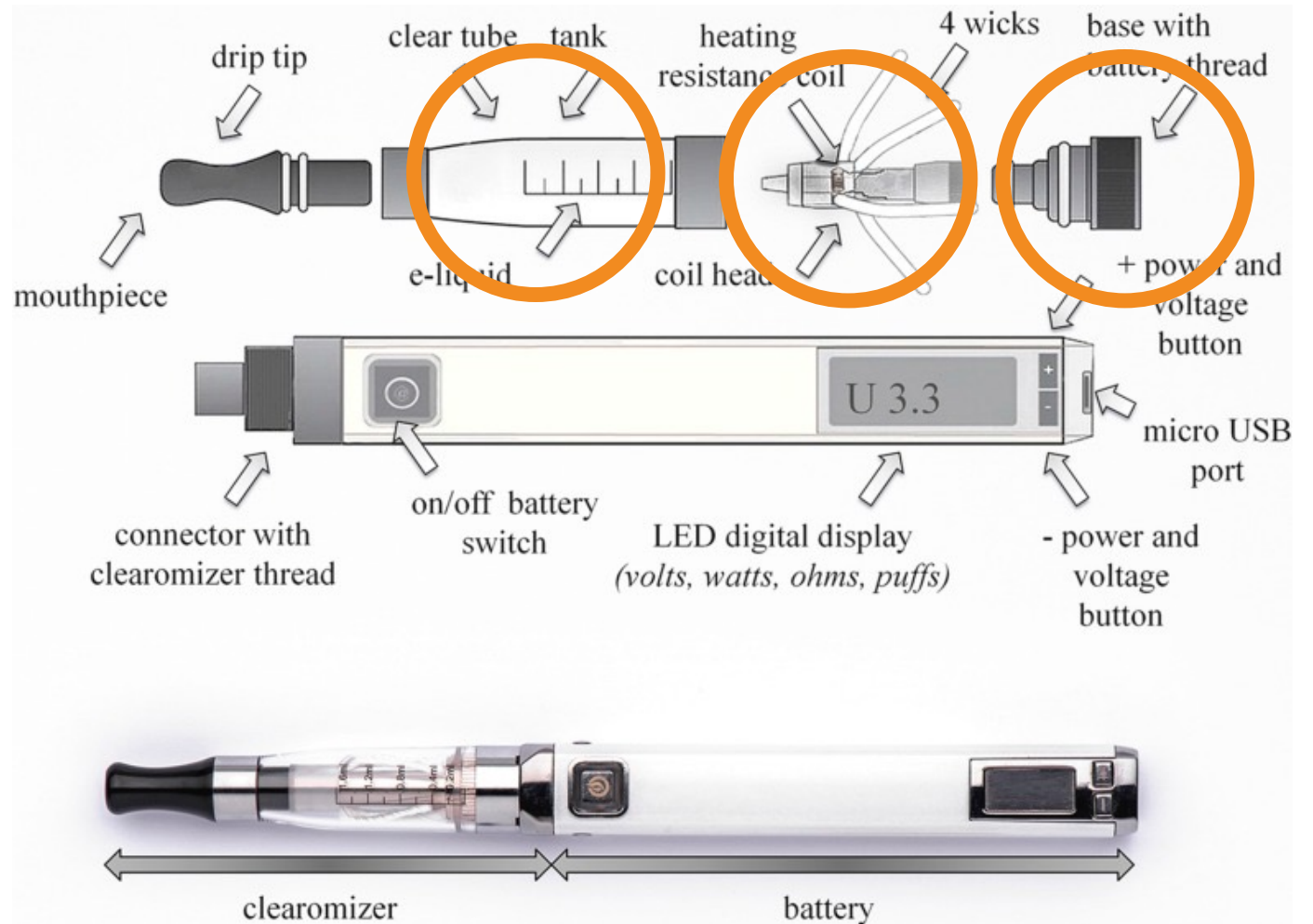




# Electronic Nicotine Delivery Systems (ENDS)

## Definition

*An electronic device that provides inhaled doses of nicotine*



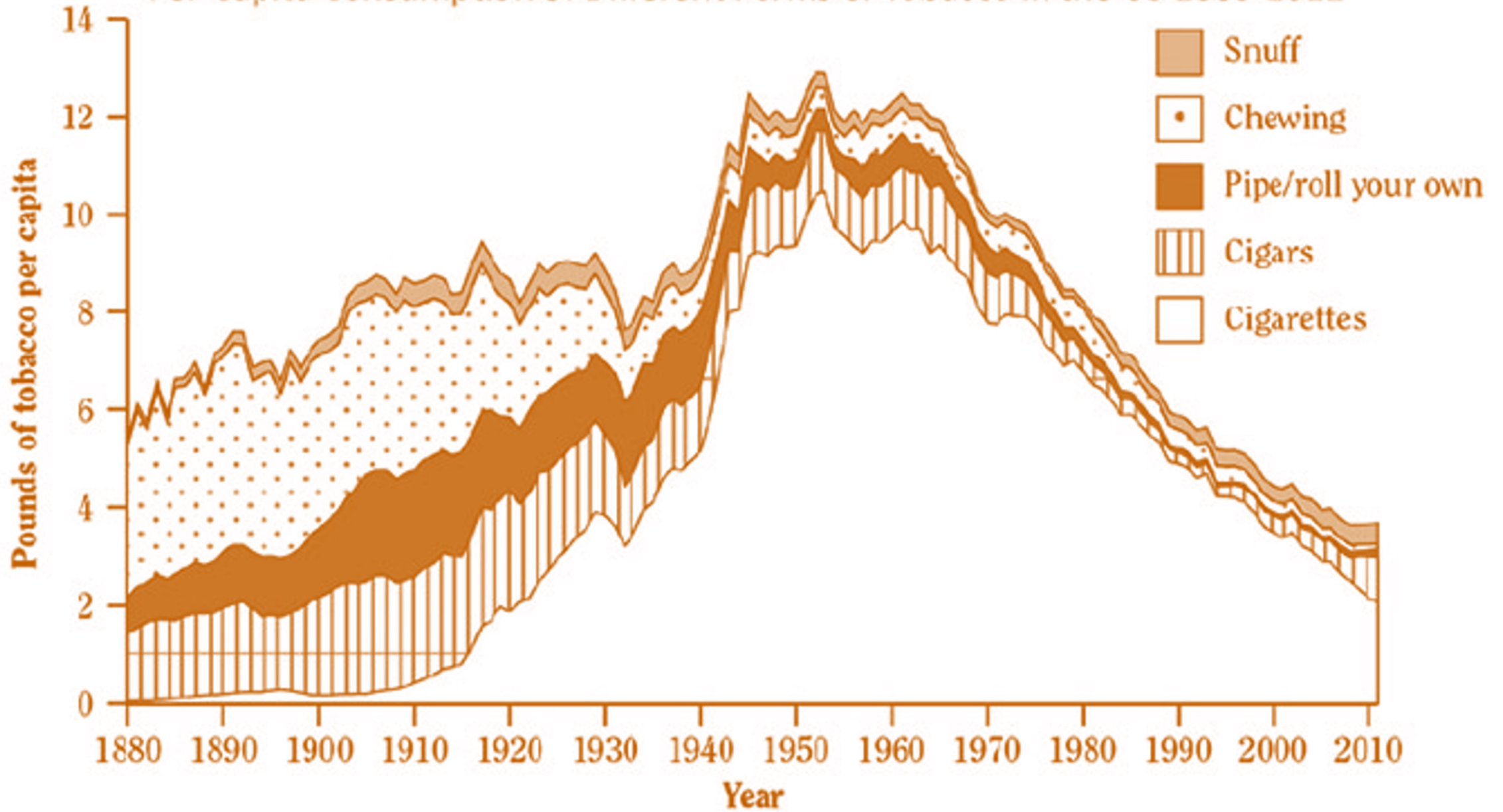




# Identifying Data Gaps



Per-Capita Consumption of Different Forms of Tobacco in the US 1880-2011



# Pharmacological Risks of Nicotine & Other Drugs

1 = "Very high"; 6= "Very low", "negligible"

Henningfield

	Nicotine	Heroin	Cocaine	Alcohol	Marijuana	Caffeine
Withdrawal	3	2	4	1	6	5
Reinforcement	4	2	1	3	5	6
Tolerance	2	1	4	3	6	5
Dependence	1	2	3	4	6	5
Intoxication	5	2	3	1	4	6

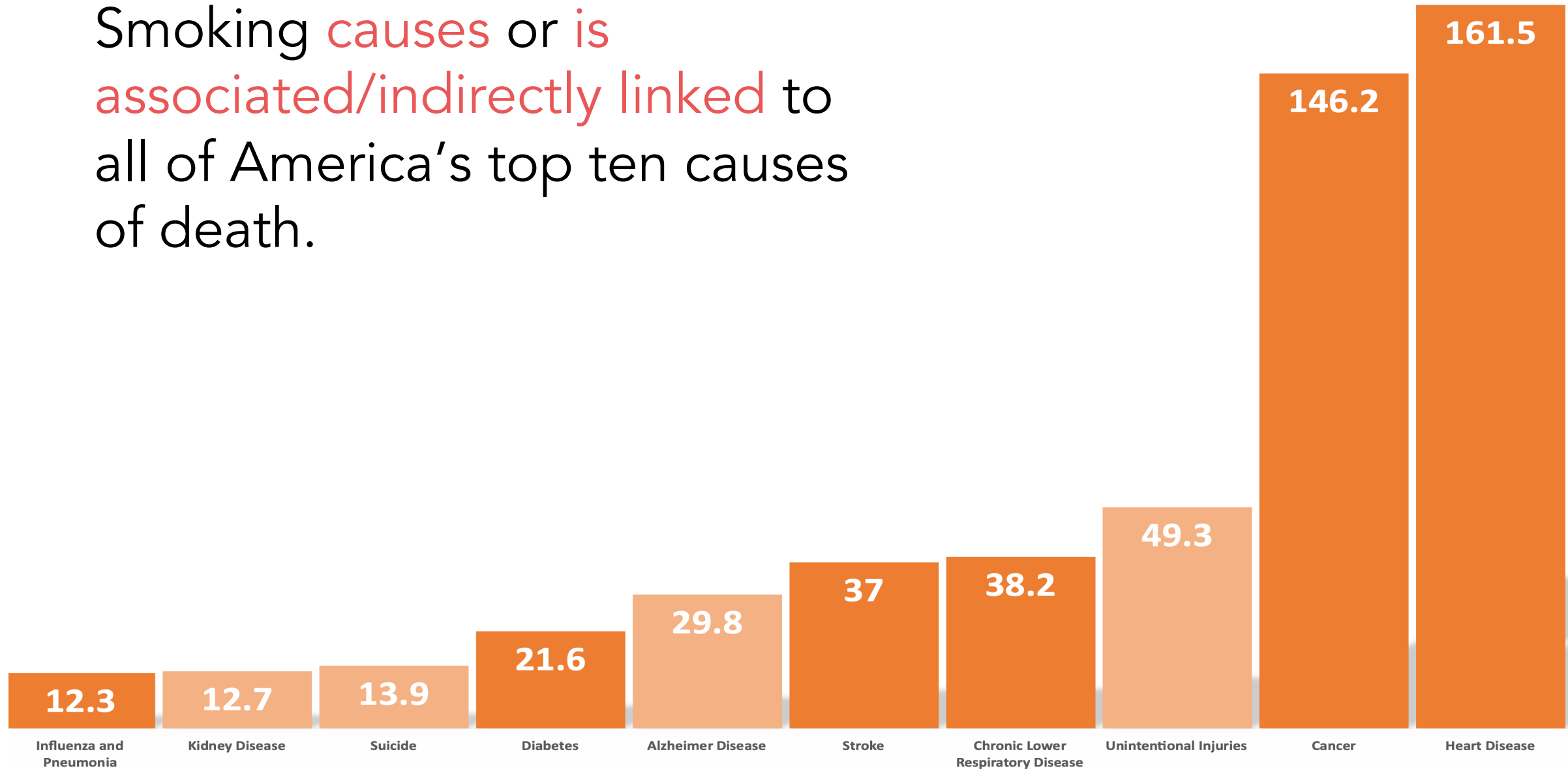
Benowitz

	Nicotine	Heroin	Cocaine	Alcohol	Marijuana	Caffeine
Withdrawal	3	2	3	1	5	4
Reinforcement	4	2	1	3	6	5
Tolerance	4	2	1	4	5	3
Dependence	1	2	3	4	6	5
Intoxication	6	2	3	1	4	5

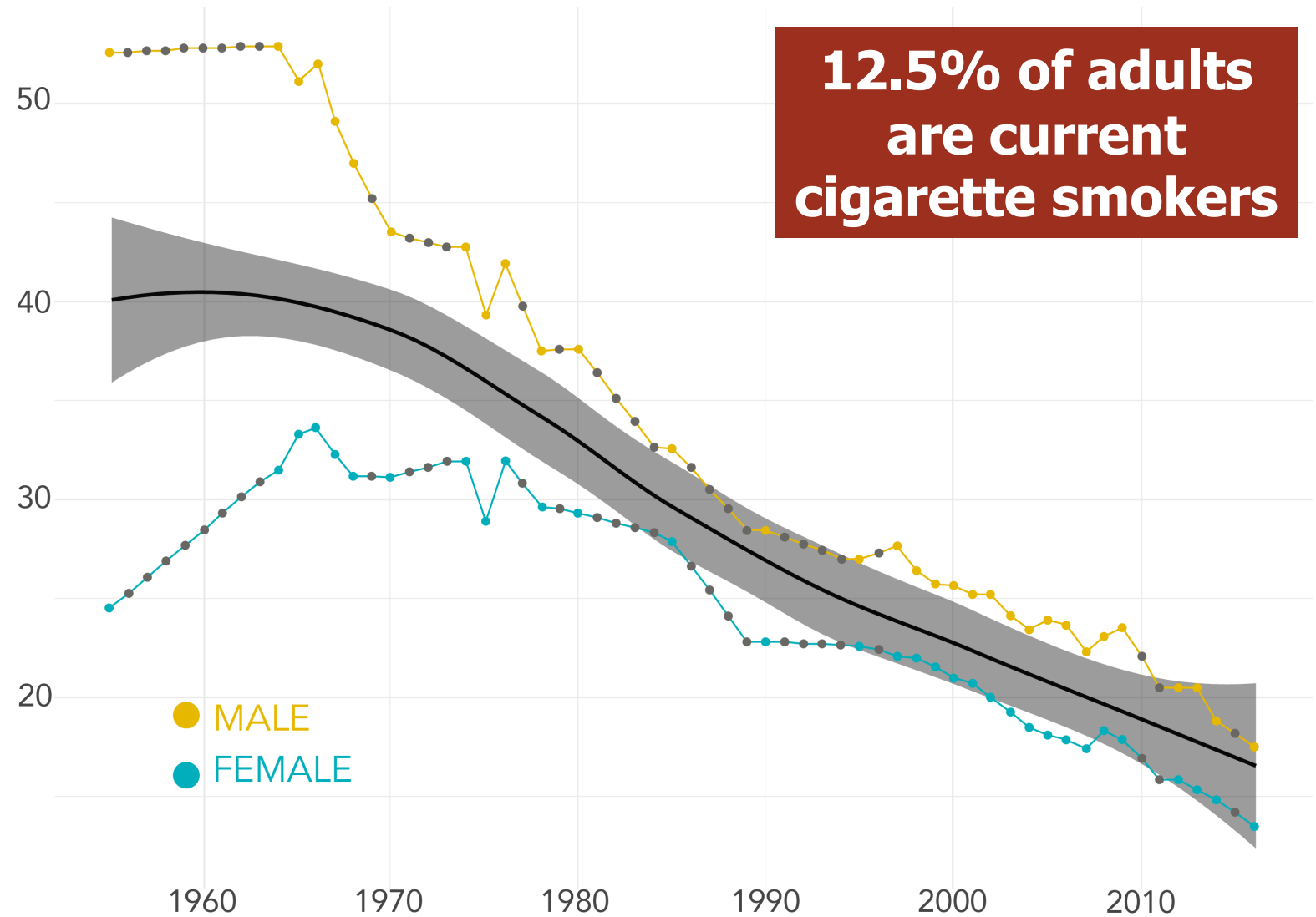
Kleiman et al.

	Nicotine	Meth	Heroin
Initiation	2	5	6
Continuation	3	5	5
Capture	1	3	2
Casual Damage	6	3	3
Heavy Damage	6	5	1
Chronicity	1	5	1
Relapse	1	5	1

Smoking **causes** or is **associated/indirectly linked** to all of America's top ten causes of death.



# Trends in U.S. Adult Smoking

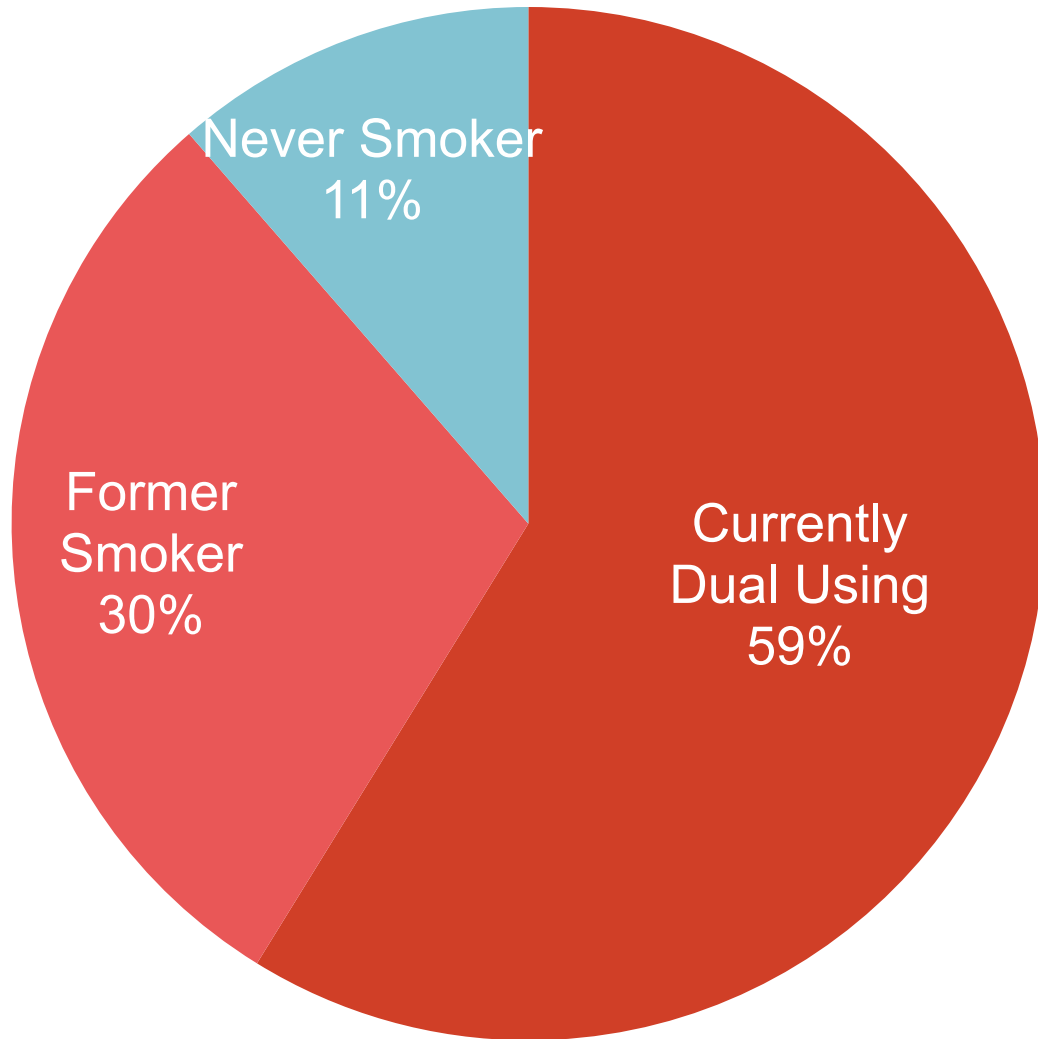




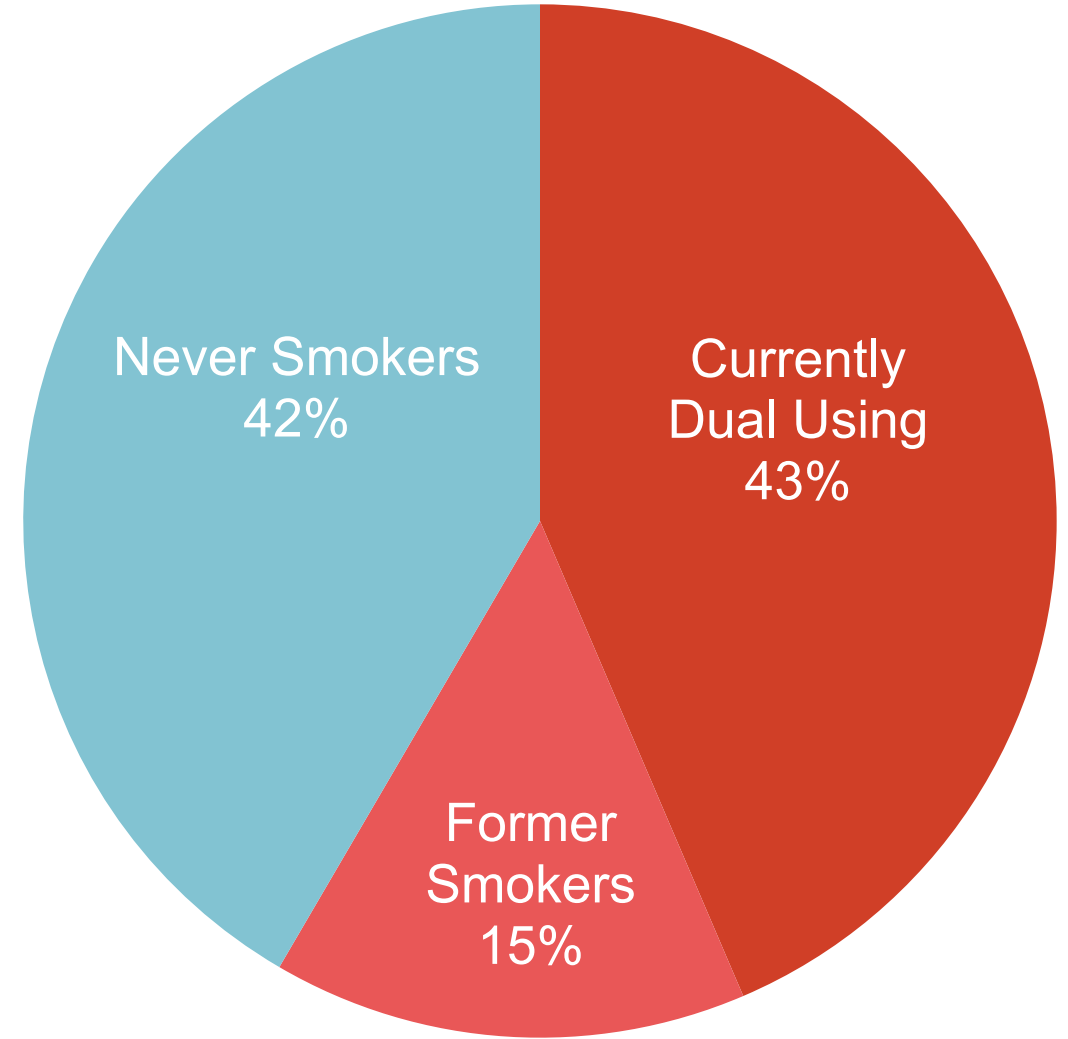
# Prevalence of Use

- 3.7% of adult Americans currently use ENDS
- 56% young adult ENDS users report being never smokers
- Young adults (18-24) have highest use among adult groups (9.4%)
- 11.3% of US high school students report use in the past 30 days
- About 14% of callers to quitlines report using ENDS

# All Adult ENDS Users (18-65)



# Young Adult ENDS Users (18-24)



# What Is a Pod Mod?



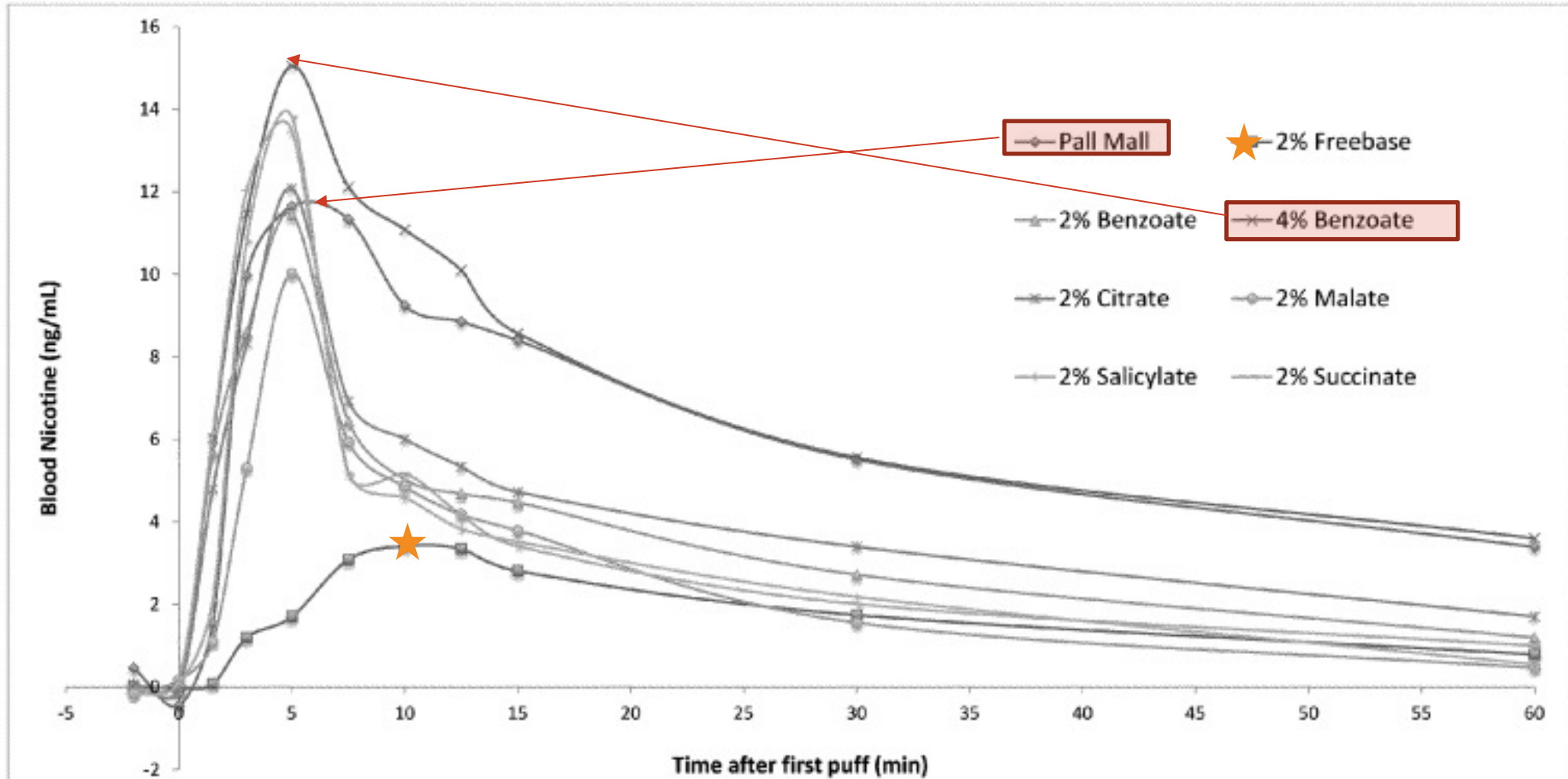
## Familiar Ideas

- A battery-powered device that provides inhaled doses of nicotine (ENDS)
- Battery is rechargeable (like 2<sup>nd</sup> and 3<sup>rd</sup> generation products)
- Not (designed to be) modifiable, except aesthetically
- Most popular products are flavors like Mango and Cool Mint

## Innovations

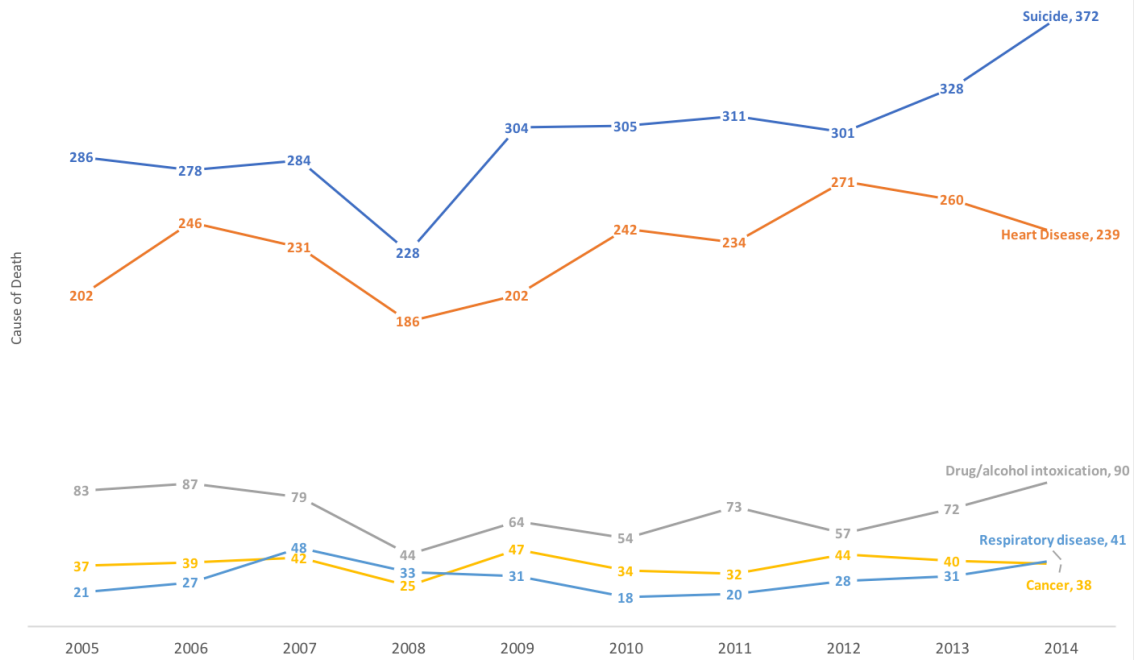
- Marketed primarily via Twitter and Instagram
- Marketed heavily (by Juul Labs) as a permanent replacement for cigarettes
- Design: “The iPhone of e-cigarettes”
- Charges by plugging it into a computer USB port
- Initially had only one concentration of nicotine (40mg/pod)
- **Nicotine salt formulation**

# Plasma Nicotine Concentrations

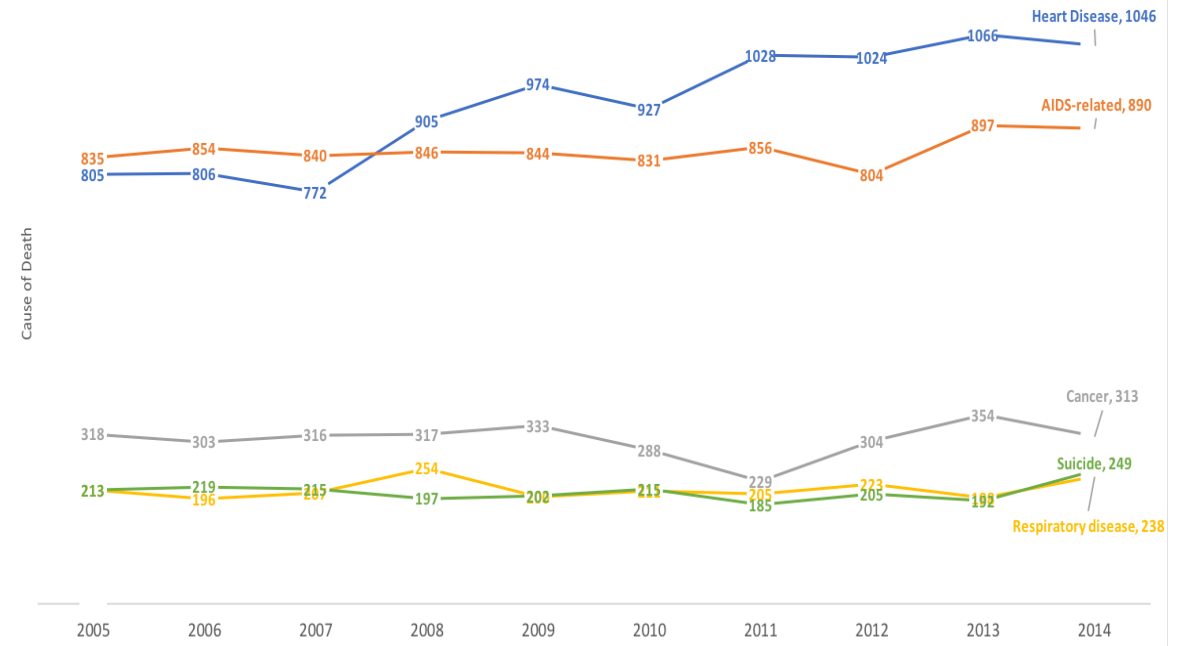


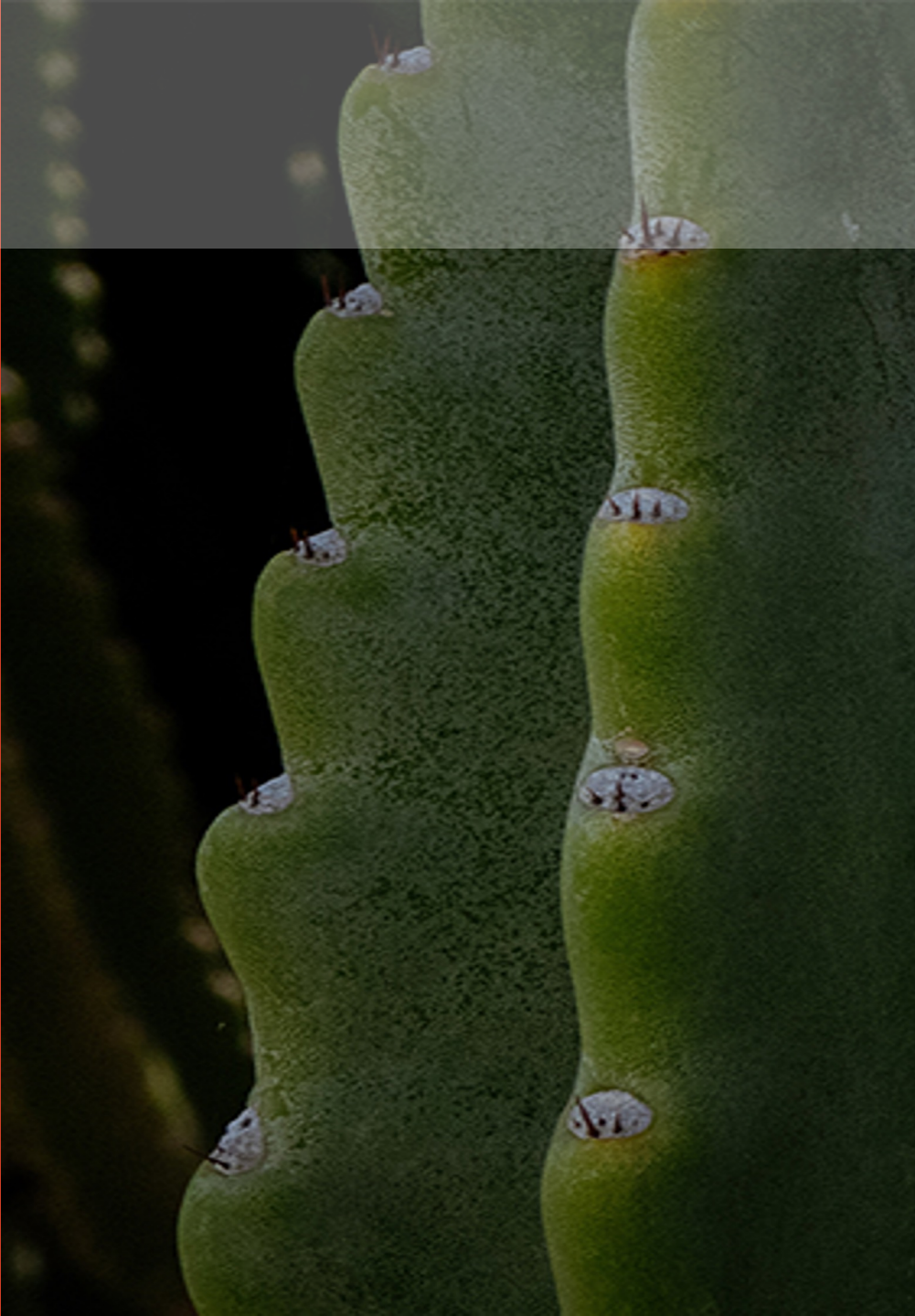


MORTALITY IN JAILS, 2005-2014



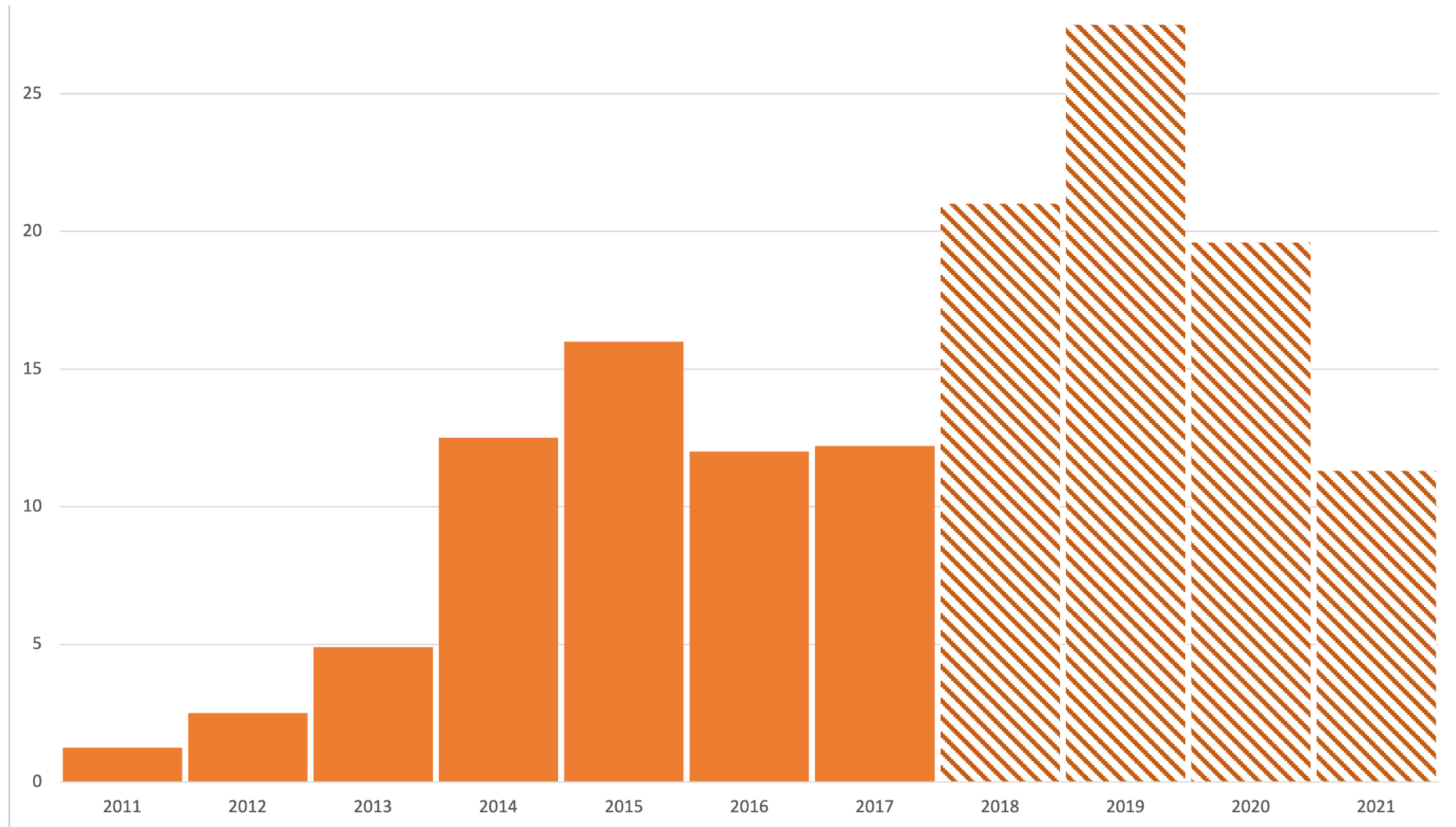
MORTALITY IN STATE PRISONS, 2015-2014





## Prevalence of ENDS Use

# ENDS Use Among High School Students



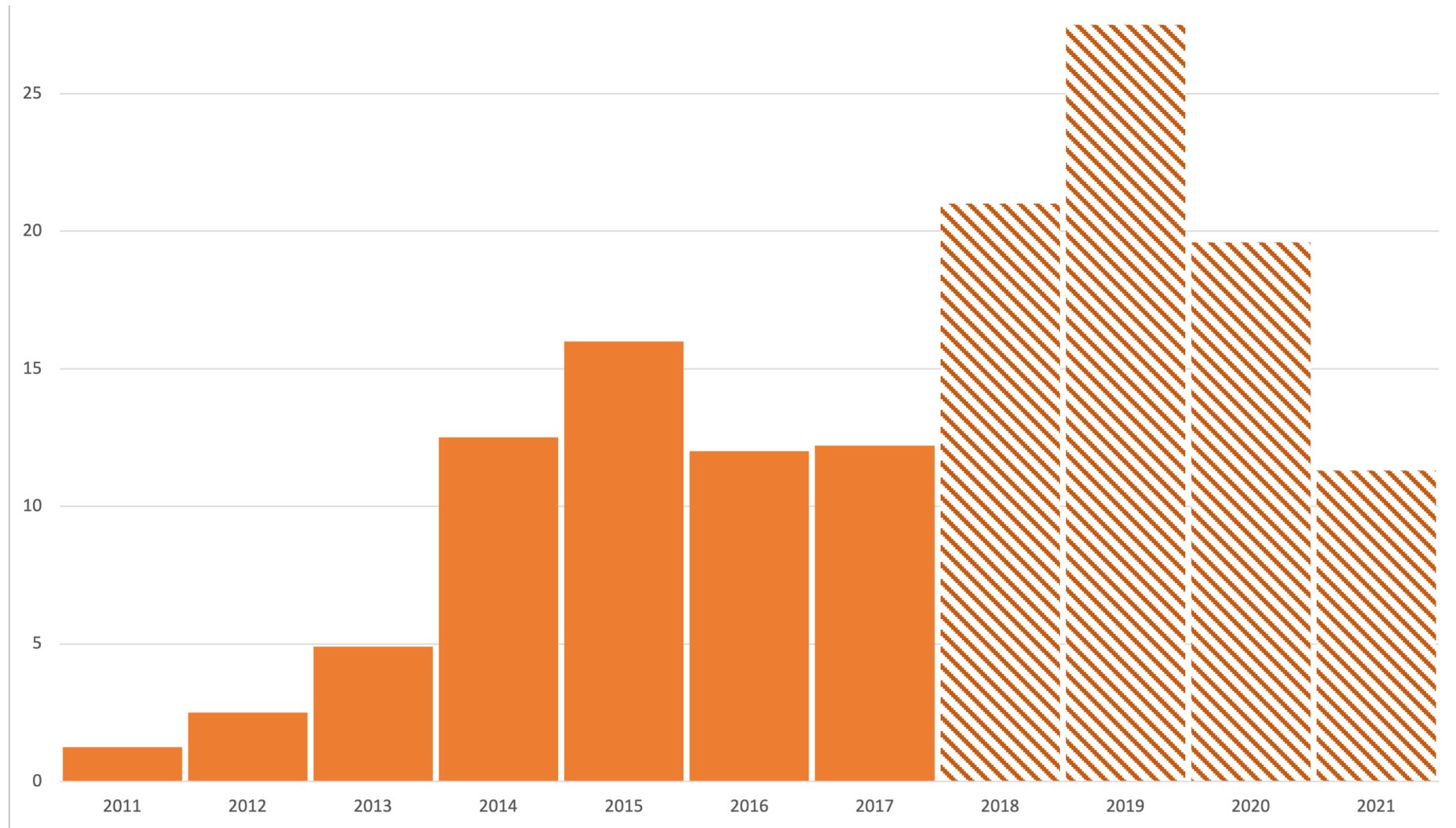
# Youth Smoking and Correlates of Incarceration Risk

**Psychological distress:** High schoolers categorized into the severe distress level are nearly 2x more likely to use tobacco products than those who have no distress.

**Low grades:** Individuals who get “mostly Fs” are more than 2x likelier to use tobacco than those who are receiving mostly As.



# ENDS Use Among High School Students



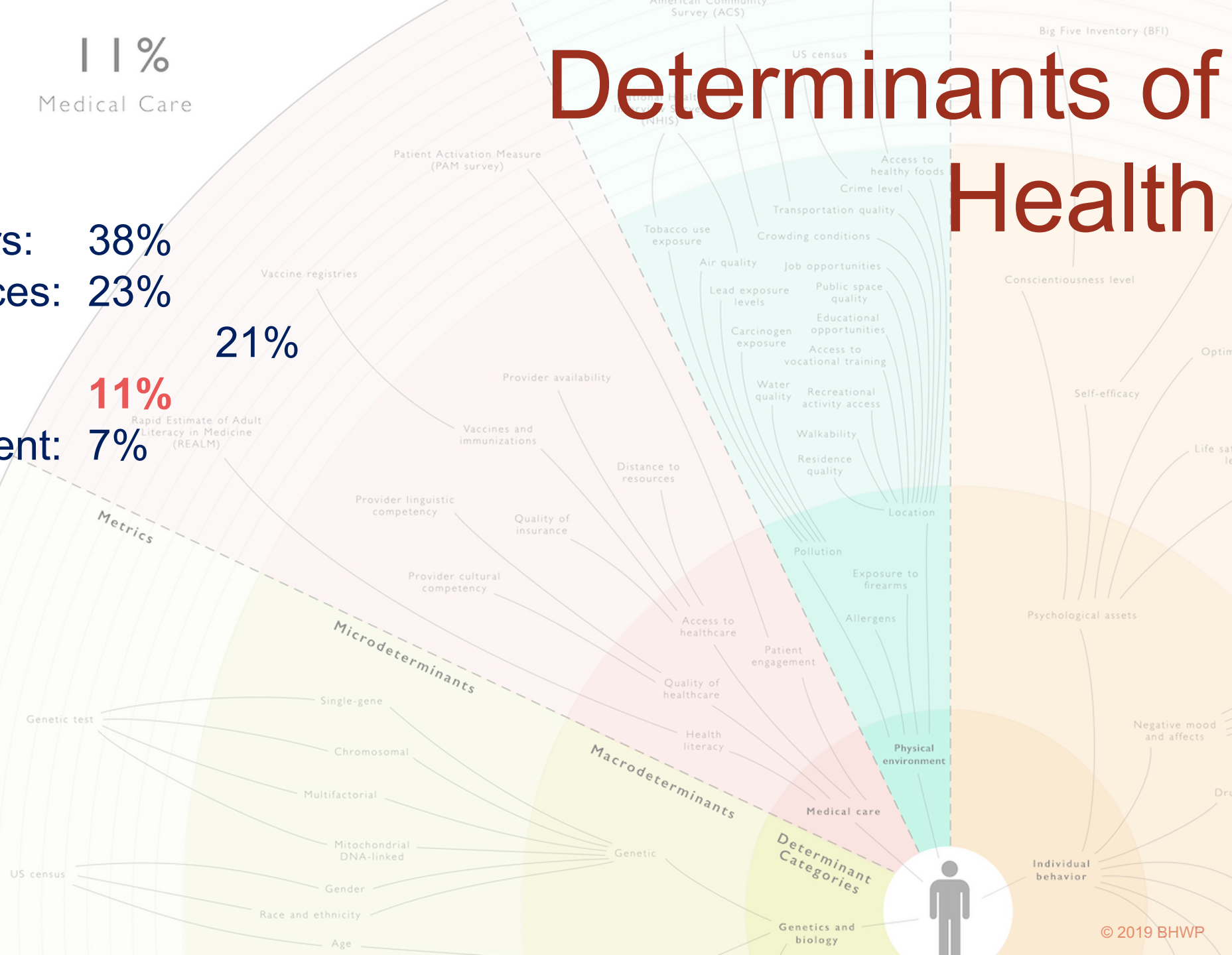


# Vaping and Social Determinants of Incarceration

# Determinants of Health

11%  
Medical Care

- Individual Behaviors: 38%
- Social Circumstances: 23%
- Genetics/Biology:
- **Medical Care:**
- Physical Environment: 7%



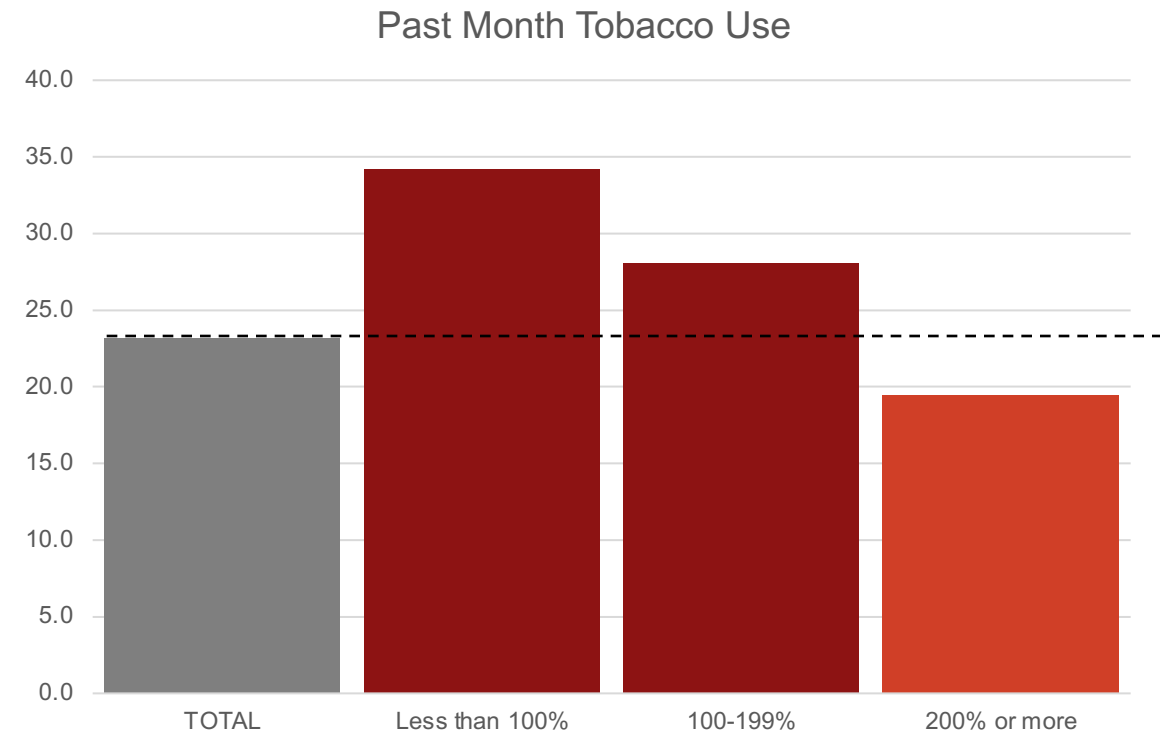
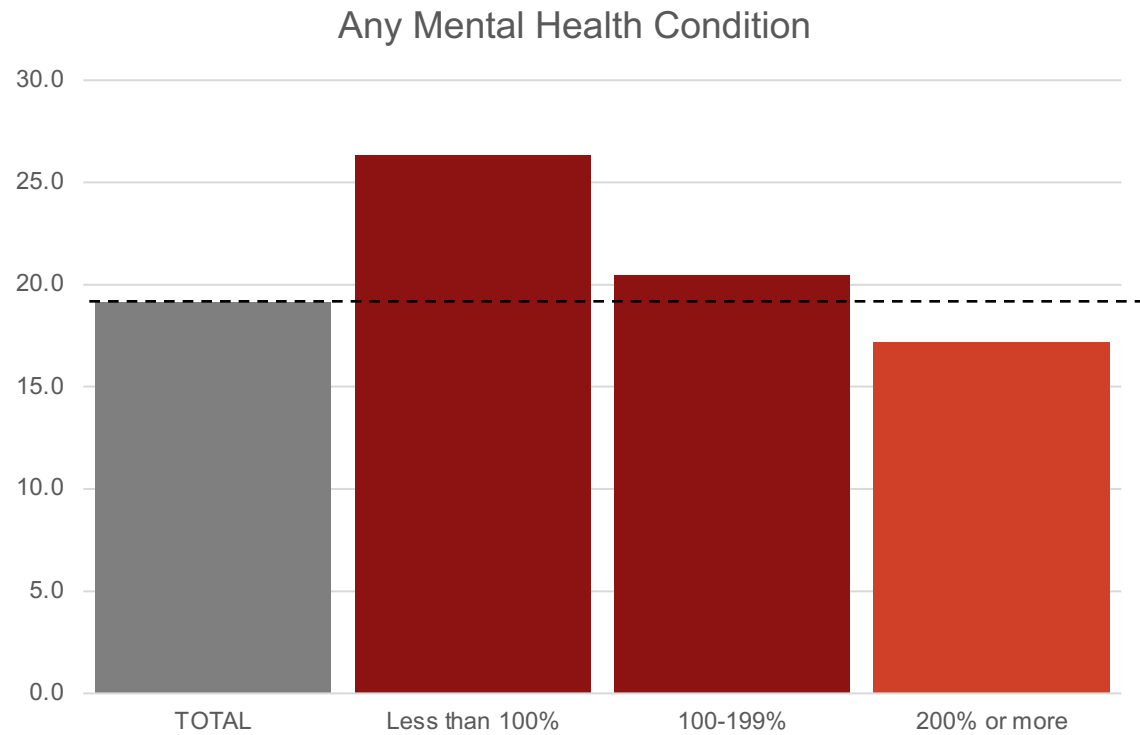
# Tobacco and Income/Education

Individuals who are working class, low income, and have low educational levels have the highest percentages of smoking behaviors

Smoking rates for those:

- Below the poverty line – **25%**
- At or above the poverty line – **14%**
- With a GED – **32%**
- With a graduate degree – **3.5%**

# Tobacco Use and Mental Health Rates by Poverty Level





# Mental Distress and Vaping, NHIS

	<b>ANXIETY</b>	<b>DEPRESSION</b>
<b>CIGARETTES</b>	21.4%	29.6%
<b>ENDS</b>	7.1%	8.3%



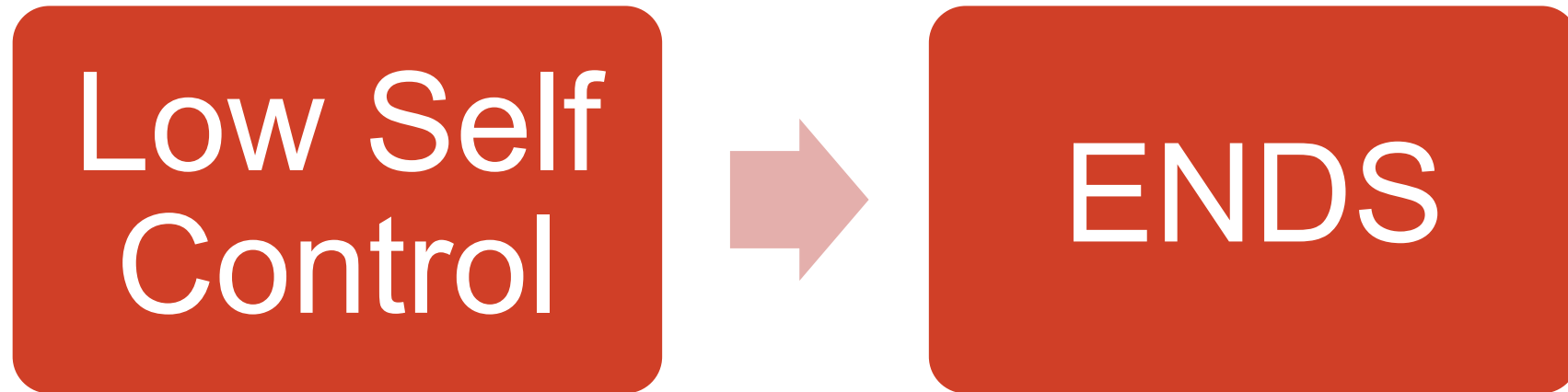


# Shared Risks: Vaping and Delinquency

- Vaping is associated with smoking (Azagba, 2018; Demisse et al., 2017; Dutra & Glantz, 2014)
- Vaping is associated with binge drinking (Westling, 2017)
- Vaping is associated with marijuana use (Vito et al., 2021)
- Vaping nicotine and marijuana together is associated with general delinquency (Jackson et al., 2019)
- Nicotine vaping is associated with use of cocaine, amphetamines, hallucinogens, heroin, ecstasy, and OTC medications. (Boccio & Jackson, 2021)

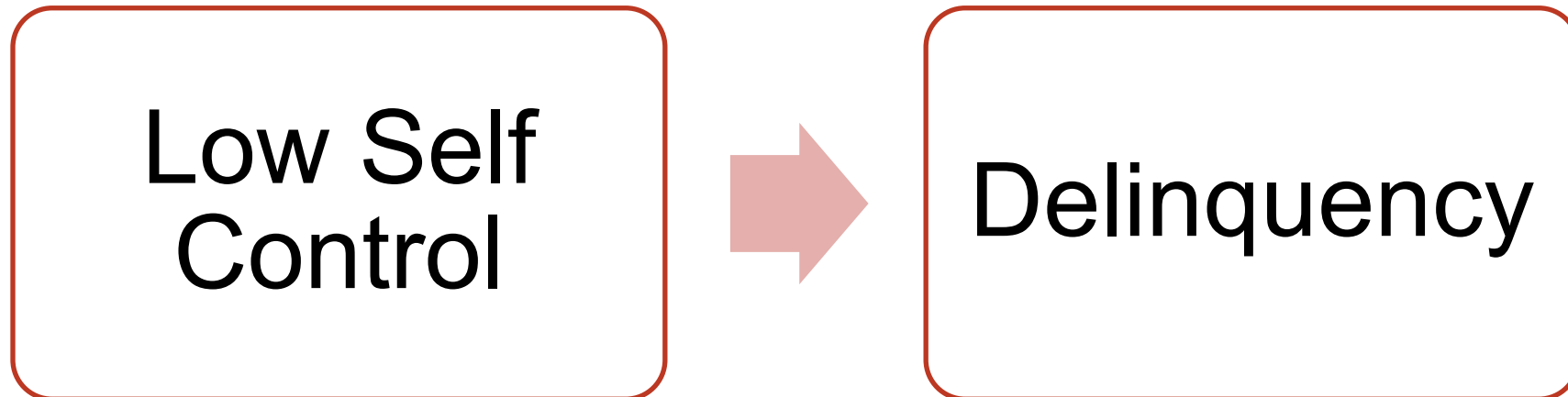


# Low Self-Control



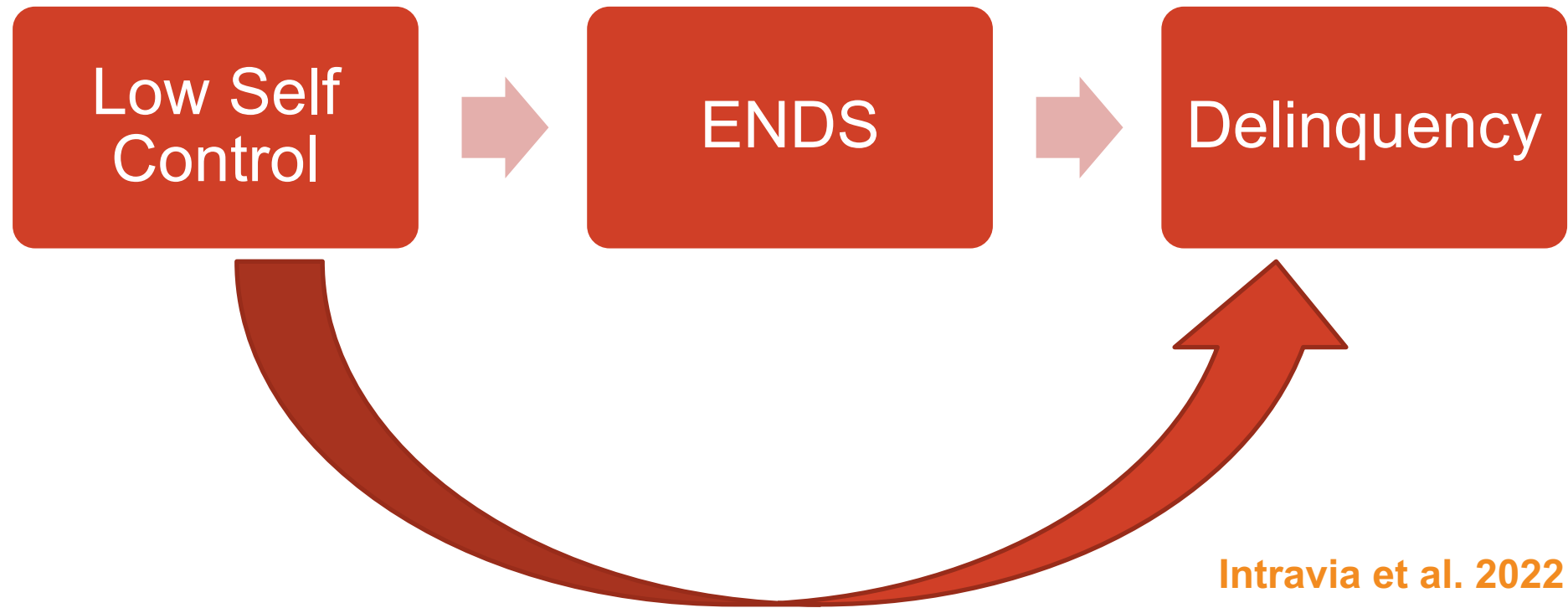
Intravia et al. 2022

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Intravia et al. 2022

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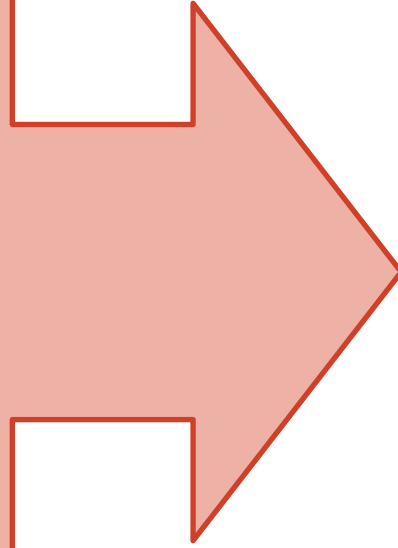
Intravia et al. 2022

# Precursors to Vaping

Police stops are associated with future drug use including vaping (Jackson et al. 2021)

“Insufficient cognitive resources” lead to poor health behaviors (Bickel et al. 2014)

- Stigma
- Low SES
- Discrimination
- Environmental Exposure
- Psychological Distress
- Chronic Stress
- Coping Skills
- ACES



- Addiction
- Incarceration
- Mental Health Conditions
- Poor Health



# ACE Study: Tobacco Use

People with 4 or more childhood exposures (compared to none) were:

- **5.4** times more likely to experience **early smoking initiation**
- **3.1** times more likely to report **ever smoking**
- **2.1** times more likely to report **current smoking**
- **2.8** times more likely to report **heavy smoking**

- ACES and VAPING
  - **ACES are positively associated with nicotine vaping and marijuana use.**
  - **Six or more ACES is associated with dual use**

Boccio et al, 2022



# ENDS and DRUGS OTHER THAN NICOTINE (DOTNs)

# Particulates in ENDS Aerosol

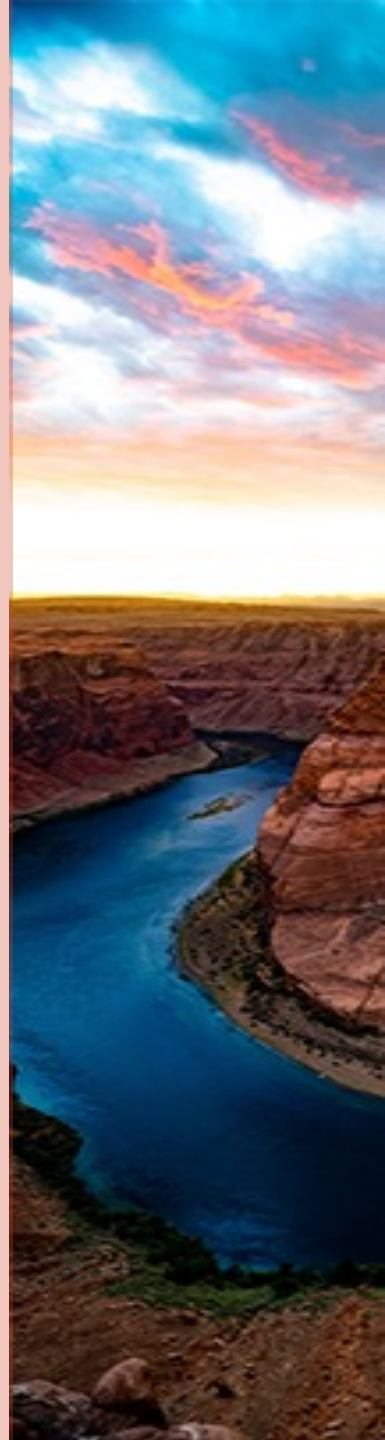
The types of particles in ENDS aerosol is influenced by a number of factors, including:

- Device engineering

- Nicotine content

- Other additives

- Puffing time



# New Cigarette Alternatives





# ENDS & DOTNs Key Takeaways

- Conclusive evidence that marijuana can and is being used in lightly or non-modified retail ENDS
- Methamphetamine can be used in modified devices (Mulder et al., 2019)
- Tends to produce quicker onset and faster duration (Marusich et al., 2016)
- Combining drugs (e.g., nicotine + methadone) alters the dose that is delivered (Krakowiak et al., 2019, Reveil et al. 2022)





# ENDS & DOTNs Risks

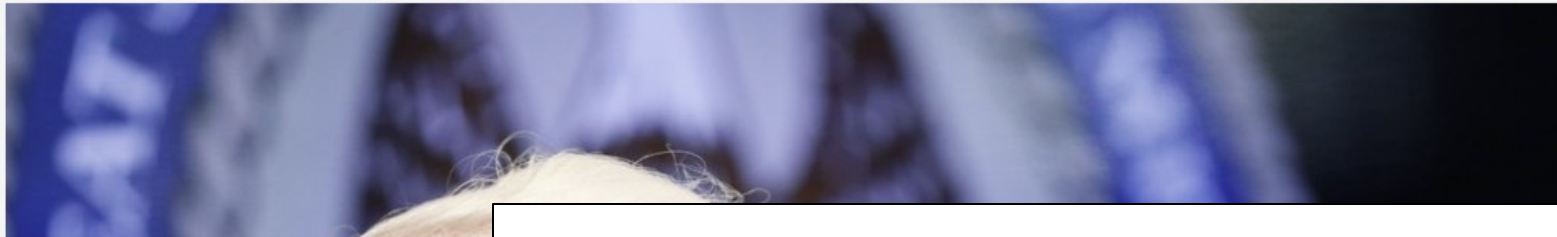
- Using products in unintended ways or modifying the devices may cause technological/mechanical failure.
- Unregulated markets may expose users to unintended levels of desired components (Frinculescu et al., 2022)
- Unregulated markets expose users to potentially harmful adulterants (Blount et al., 2020)
- Unexpected dose or effect speeds could lead to overdose
- Higher doses could increase tolerance or other elements of dependence



# Prohibitions are Weakening

## Prisons taking tobacco orders ahead of legal smoking

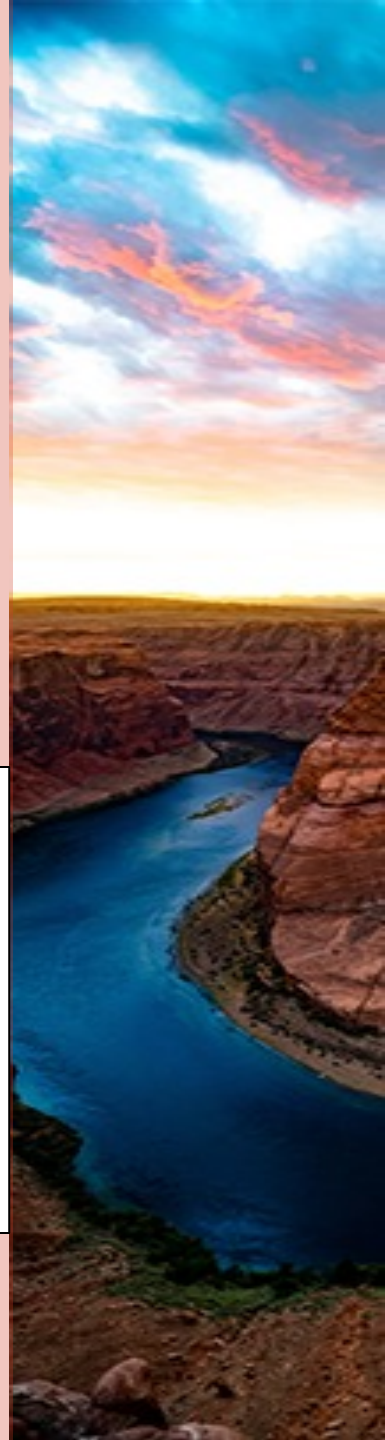
January 23, 2021



## How These Jail Officials Profit From Selling E-Cigarettes to Inmates

Many cash-strapped Kentucky jails prop up their budgets by selling e-cigarettes to inmates, making more than \$1.3 million in 2018. Some jailers, or their friends and family, are making money while jails overlook the health concerns of vaping products.

by R.G. Dunlop, Kentucky Center for Investigative Reporting, Jan. 29, 2020, 5 a.m. EST



# In Rural Jails, E-Cigarettes Are a Calming Vapor

By [Timothy Williams](#)

Jan. 23, 2014



Logan Smith with his e-cig.  
Christopher Berkey for The New York Times

LAFAYETTE, Tenn. — As city governments and schools across the country move to ban or restrict the use of electronic cigarettes, one place increasingly welcomes the devices: the rural county jail.

Though traditional cigarettes are prohibited from most prisons and jails because of fire hazards and secondhand smoke, a growing number of sheriffs say they are selling e-cigarettes to inmates to help control the mood swings of those in need of a smoke, as well as address budget shortfalls, which in some jails have meant that guards are earning little more than fast-food workers.

The trend stands in contrast to restrictions on e-cigarettes approved in Chicago, New York, Los Angeles and other big cities.

It also means a lot of revenue for the jails. They buy each ecig from Mosley for \$2-\$3 and sell them to inmates for \$15.

INDUSTRY ORIGINATORS

We don't just lead the industry. We **created** it.

Designed specifically for use in correctional facilities, the CrossBar electronic cigarette meets growing demands for improved inmate morale. Constructed of a one-piece soft plastic casing that allows the product to bend, it comes with an ultra-low voltage battery.



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In Gage County, in southeastern Nebraska, Sheriff Millard Gustafson said that he had sold out of the 200 e-cigarettes bought in December for the 32-prisoner jail, but that more would be arriving soon. “They’ve been selling like hot cakes,” he said. **“I look at this as something to control their moods. And so if they’re not a good boy or girl, I’m going to take them away, just like I do with the TVs.”**

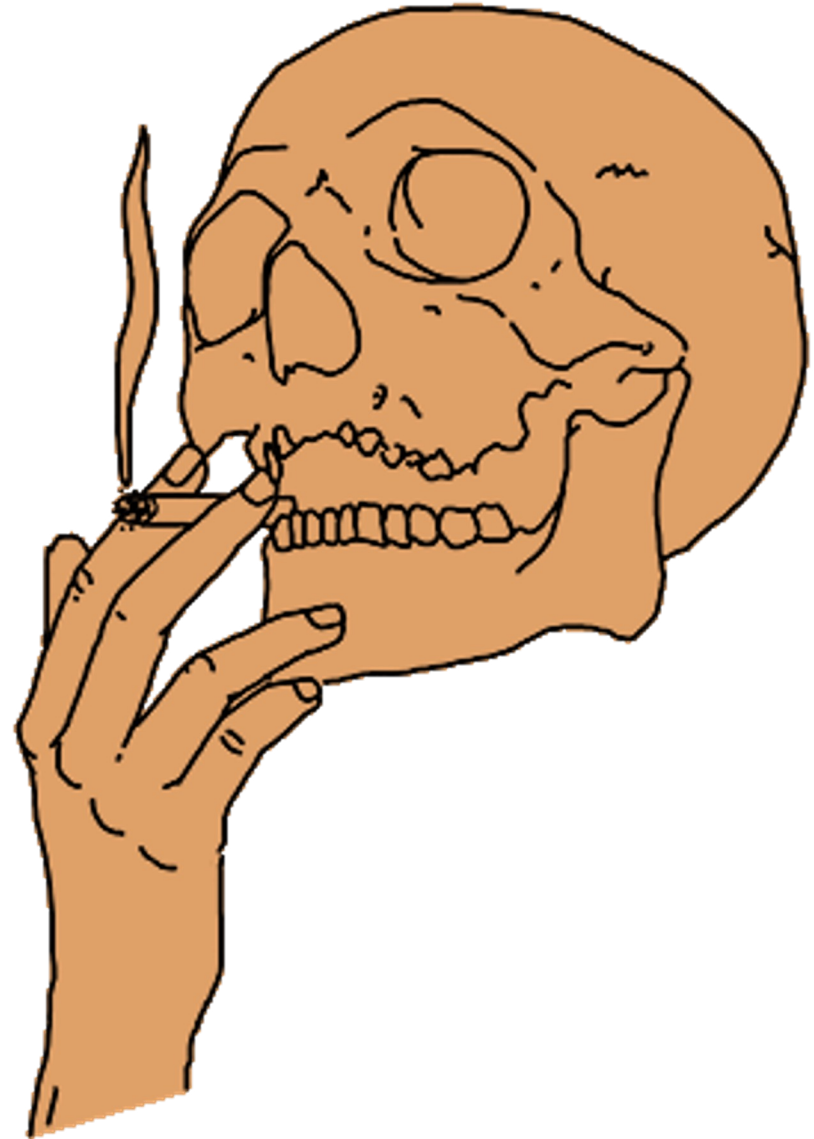
In Nebraska, Sheriff Gustafson said the influence that e-cigarettes exert over inmates has been instrumental in maintaining good order. “The thing I like about it is it controls the guy,” he said. “We had four or five fights last week. One guy who’d had a fight asked for an e-cigarette and it calmed him down. **It’s not meant to help inmates, it’s meant to help my guys.**”

# Summary

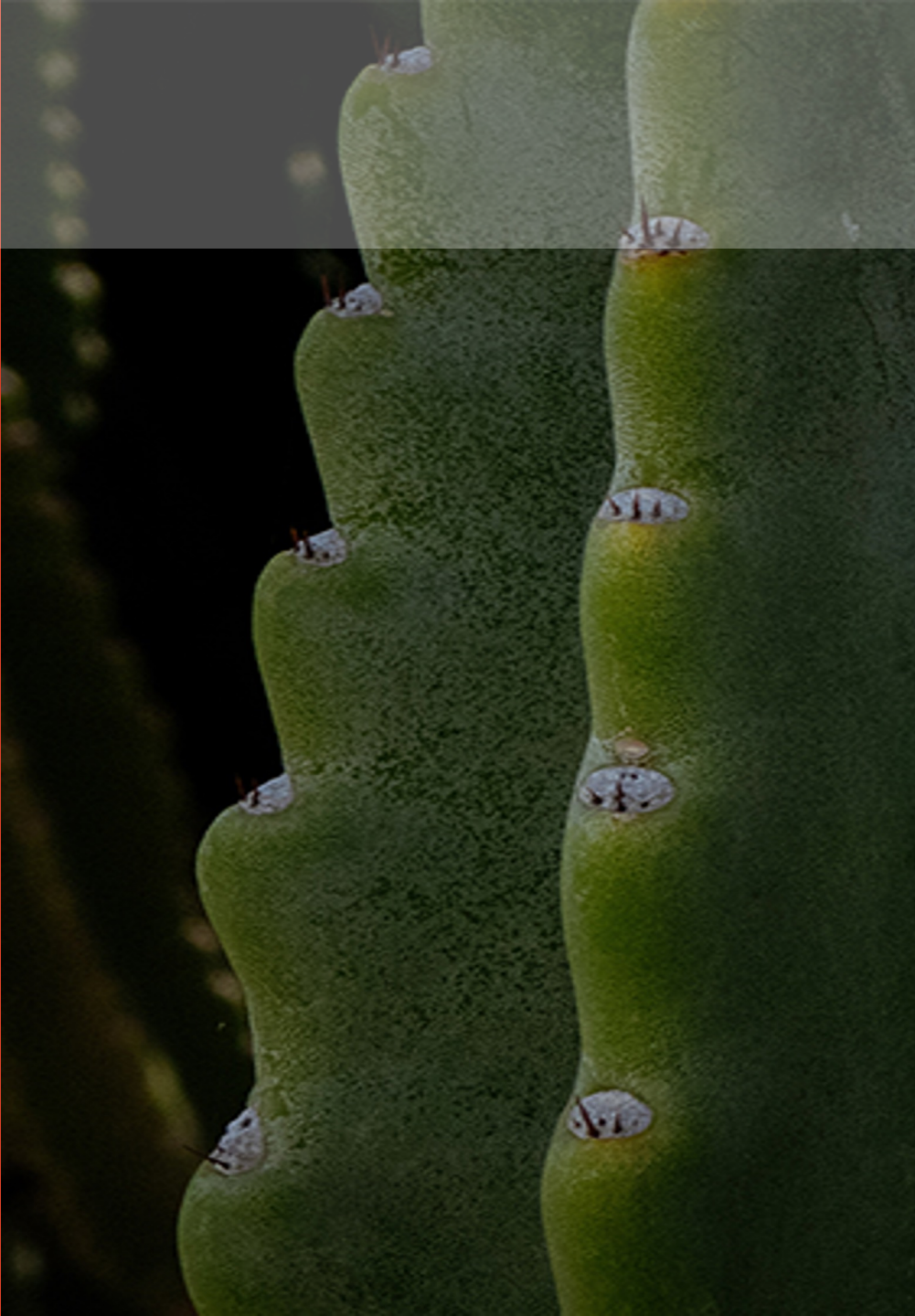
- Prevalence rates among youth are highly volatile
- New ENDS appear to be as addictive or more than conventional cigarettes
- Youth rates predict young adult rates
- Young adults are the most likely to be engaged in criminal activity
- Vaping is associated with smoking which is associated with other drug use and delinquency
- Vaping is *independently* associated with other drug use and delinquency
- Risk factors firmly established to predict smoking are also associated with vaping
- Although there are significant differences in the appeal and rationale for vaping, compared to smoking, the current trends indicate that these associations are converging over time
- So, we should expect that, over time, current smoking and vaping rates will look similarly within jails and prison
- Except maybe worse, because many (some) jails and prisons are currently incentivized toward abstinence while future inmates may be incentivized to vape

“The cigarette is among the most awe-inspiring examples of the ingenuity of man. The cigarette should be conceived not as a product but as a package. The product is **nicotine**. Smoke is beyond question the most optimized vehicle of nicotine and the cigarette the most optimized dispenser of smoke.”

*William L. Dunn, Jr., Philip Morris (1972)*







Ask me a question



# Behavioral Health & Wellness Program

303.724.3713

[bh.wellness@ucdenver.edu](mailto:bh.wellness@ucdenver.edu)

[www.bhwellness.org](http://www.bhwellness.org)



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