Urgent and Emerging Issues in Prevention: Marijuana, Kratom, E-cigarettes

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SAMHSA Prevention Day 2019

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Preventionists-Key to the Health and Welfare of Americans

- Opioids crisis continues, but with evidence for positive effects of government efforts in partnership with states, communities, organizations
- Ongoing work of preventionists, clinicians, peers, first responders, faith-based groups, volunteers, families
  - Major decline in heroin initiates in 2017
  - Large increases in naloxone distribution, overdose reversals

- Prevention becomes even more important as we watch the unfolding story of the impact of substance use on American communities
- Preventionists: the first line in addressing the risks presented by substance use in our communities
- Increased focus on potential harms of substances
- Raise awareness of risks with substance use
- Community outreach to youth as well as adults

Substances of Increasing Importance: Marijuana, Kratom and E-cigarettes (Nicotine)

- **Marijuana/cannabis:**
  - Increasing prevalence of use
  - Increasing understanding of risks associated with use
  - Public lack of information on these risks
- **Opioids Issues:**
- Fentanyl-Contaminated Cocaine
- **Kratom**
  - Botanical that at low doses produce stimulation and at higher doses produce opioid effects
  - Potential for physical dependence and opioid-type effects/toxicities
  - Marketed in Western countries and increasing use/toxicities being reported
- **E-cigarettes**
  - Vaping: heating and aerosolizing nicotine for inhalation
  - Nicotine is addictive and has adverse health effects
  - In 2017 e-cigs were the most commonly used nicotine product among high (11.7%; 1.73 million) and middle (3.3%; 0.39 million) school students.

Marijuana: The Issue

- Marijuana is rapidly becoming more widely available in the U.S.
  - 33 states: allow medical marijuana with reduced penalties for possession; 9 states plus DC have legalized recreational use
  - Huge and profitable industry that markets heavily with health claims that have little to no basis and which have had virtually no counter arguments put forward until the present time
    - Numerous forms: smoked, edibles, oil for vaping, lotions, transdermal patches

Marijuana: The Issue

- Increasing potency of marijuana:
  - THC content: 3.8% (1990s) increased to 12.2% (2014)
  - Average MJ extract has THC levels at ≥ 50%
  - THC: component responsible for euphoria/intoxication
  - Can also produce anxiety, agitation, paranoia, and psychosis
  - Responsible for addiction liability with estimates that 10-20% of users will develop a use disorder (Volkow ND et al. 2016)
- Declining CBD content in currently available MJ
  - Not thought to be addictive
  - May reduce psychosis
  - Medical value: FDA approved for certain seizure disorders (Ehsoly MA et al. 2016)

Risks and Adverse Outcomes

- **Downplayed by industry; ignored by states**
  - Low birth weight
  - Pulmonary symptoms
  - MVAs
  - Cognitive impairment
  - Poor performance in school and at work
  - Addiction

What Happens as State Laws Liberalize?

Past Year Marijuana Use among Persons Aged 12 or Older Residing in States with No Legalization of Marijuana, by State: Percentages and Estimated Numbers (in Thousands), Annual Averages Based on 2012-2013, 2013-2014, 2014-2015, and 2015-2016 NSDUHs

Range: 9-13%

State	Effective Date	2012-13 Percentages	2012-13 Numbers	2013-14 Percentages	2013-14 Numbers	2014-15 Percentages	2014-15 Numbers	2015-16 Percentages	2015-16 Numbers
Alabama	N/A	9.69%	389	9.98%	404	9.60%	389	9.50%	386
Georgia	N/A	11.44%	925	11.75%	963	12.67%	1,052	12.46%	1,048
Idaho	N/A	9.82%	127	11.58%	152	11.40%	152	11.62%	158
Indiana	N/A	11.05%	598	12.86%	700	13.88%	760	13.35%	733
Iowa	N/A	10.40%	266	9.74%	251	9.05%	235	9.75%	254
Kansas	N/A	8.21%	192	11.01%	259	12.38%	292	11.17%	265
Kentucky	N/A	9.22%	334	10.93%	398	12.28%	449	12.79%	470
Louisiana	N/A	10.76%	405	11.23%	425	11.22%	427	11.22%	429
Mississippi	N/A	8.78%	213	9.40%	229	8.67%	212	9.46%	231
Missouri	N/A	11.64%	581	12.73%	639	13.53%	683	13.19%	668
Nebraska	N/A	9.98%	152	10.35%	158	10.75%	166	11.33%	176
North Carolina	N/A	10.88%	877	12.07%	986	11.79%	975	11.90%	996
North Dakota	N/A	9.92%	58	10.25%	62	9.90%	61	9.80%	61
Oklahoma	N/A	9.97%	310	10.75%	338	11.28%	358	11.18%	357
South Carolina	N/A	11.72%	460	11.55%	460	12.56%	507	10.92%	448
South Dakota	N/A	9.64%	66	8.97%	62	10.77%	75	11.85%	83
Tennessee	N/A	9.93%	535	10.29%	560	11.05%	606	12.82%	709
Texas	N/A	9.38%	1,972	9.52%	2,043	10.10%	2,213	10.14%	2,264
Utah	N/A	8.76%	196	9.84%	224	9.07%	211	9.62%	229
Virginia	N/A	12.39%	839	13.04%	891	11.54%	796	11.06%	768
West Virginia	N/A	10.12%	159	10.93%	172	11.07%	174	11.45%	179
Wisconsin	N/A	11.12%	534	11.86%	572	12.05%	584	12.18%	592
Wyoming	N/A	10.11%	48	10.72%	51	10.87%	52	10.62%	51

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Range: 11-21.8%

State	Effective Date	2012-13 Percentages	2012-13 Numbers	2013-14 Percentages	2013-14 Numbers	2014-15 Percentages	2014-15 Numbers	2015-16 Percentages	2015-16 Numbers
Arizona	Nov 2, 2010	12.94%	699	13.69%	752	13.12%	734	12.22%	696
Arkansas	Nov 9, 2016	9.69%	235	11.37%	277	11.59%	284	11.14%	274
Connecticut	Oct 1, 2012	14.00%	425	14.00%	427	15.67%	479	15.08%	461
Delaware	Jul 1, 2011	13.97%	108	13.98%	109	13.06%	103	13.18%	105
Florida	Jan 3, 2017	11.43%	1,885	11.87%	1,990	12.59%	2,152	13.07%	2,275
Hawaii	Dec 28, 2000	13.37%	151	12.58%	144	12.72%	147	13.05%	151
Illinois	Jan 1, 2014	11.66%	1,247	12.16%	1,305	12.47%	1,339	12.31%	1,320
Maryland	Jun 1, 2014	11.47%	565	13.48%	670	15.13%	757	15.50%	779
Michigan	Dec 4, 2008	15.22%	1,268	15.60%	1,304	15.10%	1,266	15.68%	1,317
Minnesota	May 30, 2014	11.93%	536	12.22%	553	12.69%	579	12.91%	592
Montana	Nov 2, 2004	15.78%	134	14.07%	120	15.38%	133	18.41%	160
New Hampshire	Jul 23, 2013	15.39%	175	16.95%	194	17.35%	199	17.58%	202
New Jersey	Jul 1, 2010	10.18%	759	11.25%	844	11.86%	894	12.01%	907
New Mexico	Jul 1, 2007	15.09%	257	15.61%	267	14.72%	253	15.83%	272
New York	Jul 5, 2014	14.13%	2,342	14.24%	2,372	15.04%	2,519	14.86%	2,491
Ohio	Sep 8, 2016	12.81%	1,237	11.57%	1,122	12.13%	1,179	13.81%	1,344
Pennsylvania	May 17, 2016	11.33%	1,223	11.70%	1,265	12.35%	1,339	13.05%	1,415
Rhode Island	Jan 3, 2006	20.22%	181	18.95%	170	18.81%	170	20.31%	184
Vermont	Jul 1, 2004	19.10%	104	19.97%	108	20.50%	111	21.79%	118

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What Happens as State Laws Liberalize?

Past Year Marijuana Use among Persons Aged 12 or Older Residing in States with Legal Medical and Recreational Marijuana Use, by State: Percentages and Estimated Numbers (in Thousands), Annual Averages Based on 2012-2013, 2013-2014, 2014-2015, and 2015-2016 NSDUHs

Range: 13-25%

State	Effective Date	2012-13 Percentages	2012-13 Numbers	2013-14 Percentages	2013-14 Numbers	2014-15 Percentages	2014-15 Numbers	2015-16 Percentages	2015-16 Numbers
Alaska	Feb 24, 2015	19.69%	114	19.60%	114	21.92%	127	23.00%	134
California	Nov 9, 2016 (revised penalties)	13.89%	4,384	14.49%	4,633	15.25%	4,936	16.23%	5,296
Colorado	Dec 10, 2012 (revised penalties); Jan 1, 2014 (commercial sales)	18.92%	814	20.74%	909	23.09%	1,033	23.12%	1,057
District of Columbia	Feb 26, 2015	21.02%	116	21.70%	121	23.51%	134	24.68%	143
Maine	Jan 30, 2017 (grow and possess)	16.24%	186	19.55%	224	19.69%	227	19.81%	228
Massachusetts	Dec 15, 2016	15.57%	885	17.23%	989	18.26%	1,058	18.64%	1,088
Nevada	Jan 1, 2017	14.10%	324	13.01%	304	12.95%	309	13.13%	319
Oregon	Mar 29, 2016	19.03%	630	19.39%	649	19.42%	659	22.70%	783
Washington	Dec 6, 2012	17.48%	1,008	18.92%	1,105	17.49%	1,037	18.93%	1,140

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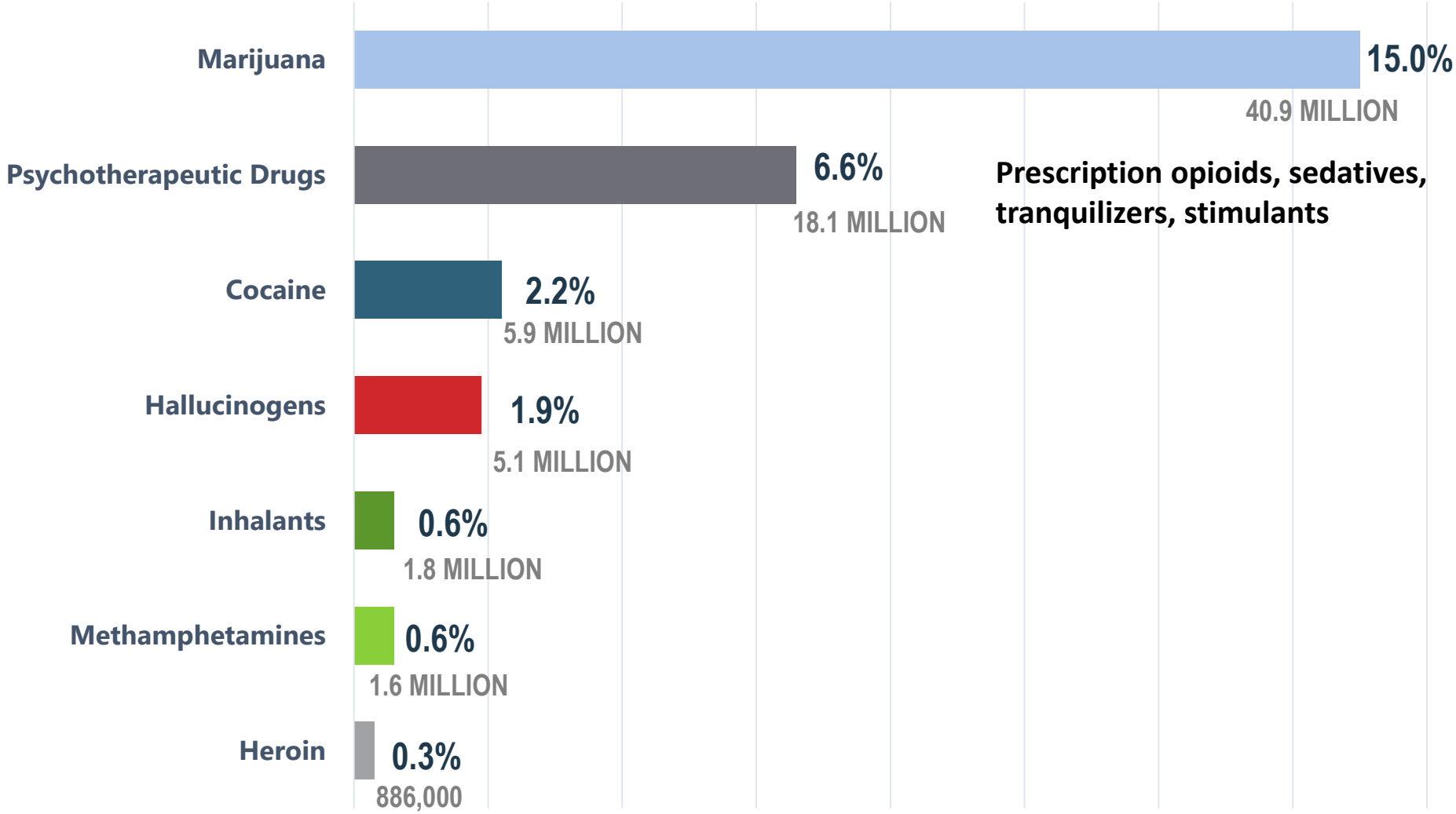
Illicit Drug Use Impacts Millions: Marijuana Most Widely Used Drug

PAST YEAR, 2017, 12+



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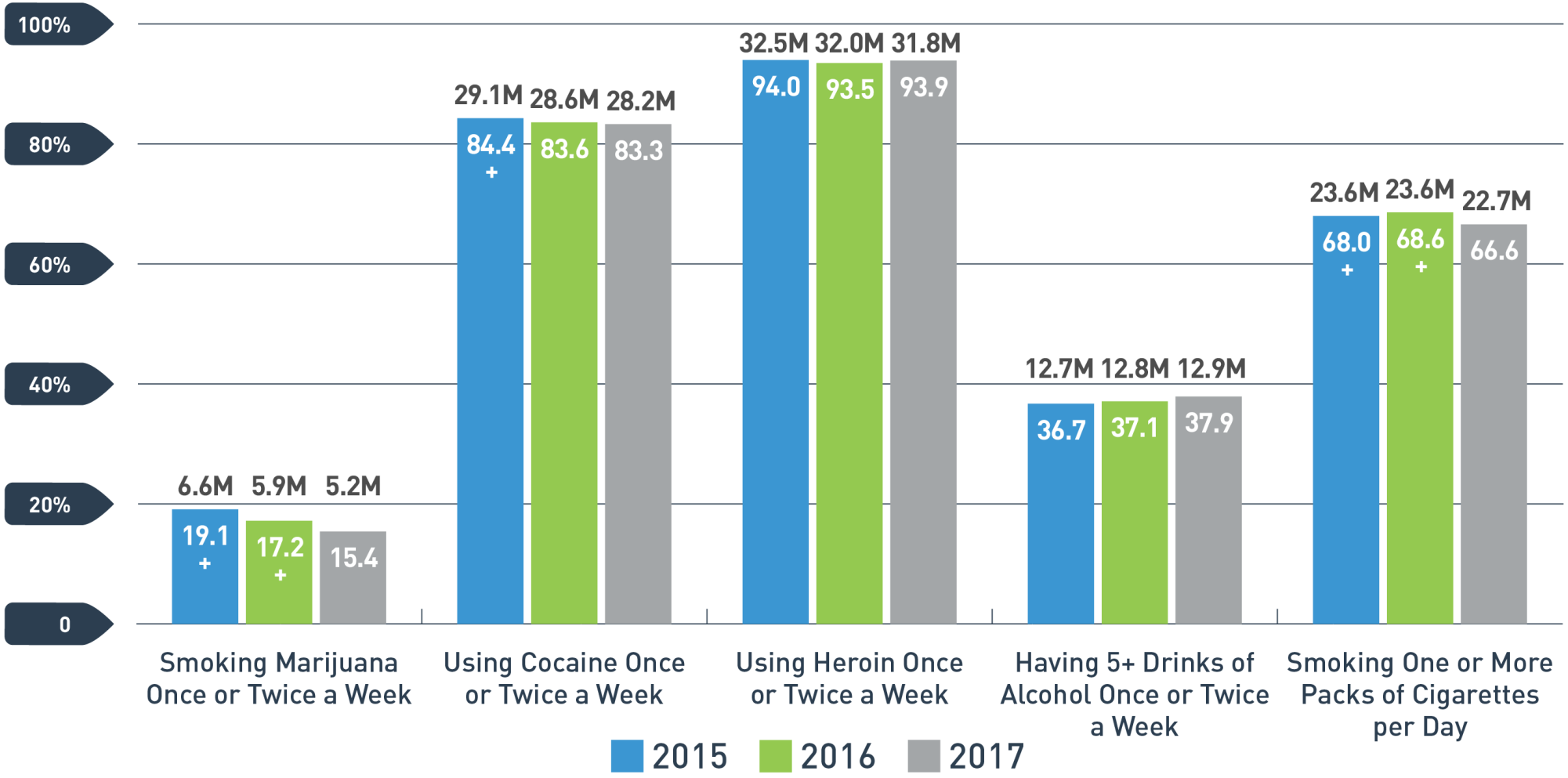
How did we get to where we are and what does the data tell us about ongoing risks?

Young Adult Perceptions of Great Risk of Harm From Substance Use

PAST YEAR, 2015 - 2017, 18-25



See table 3.1 in the 2016 and 2017 NSDUH detailed tables for additional information.

+ Difference between this estimate and the 2017 estimate is statistically significant at the .05 level.

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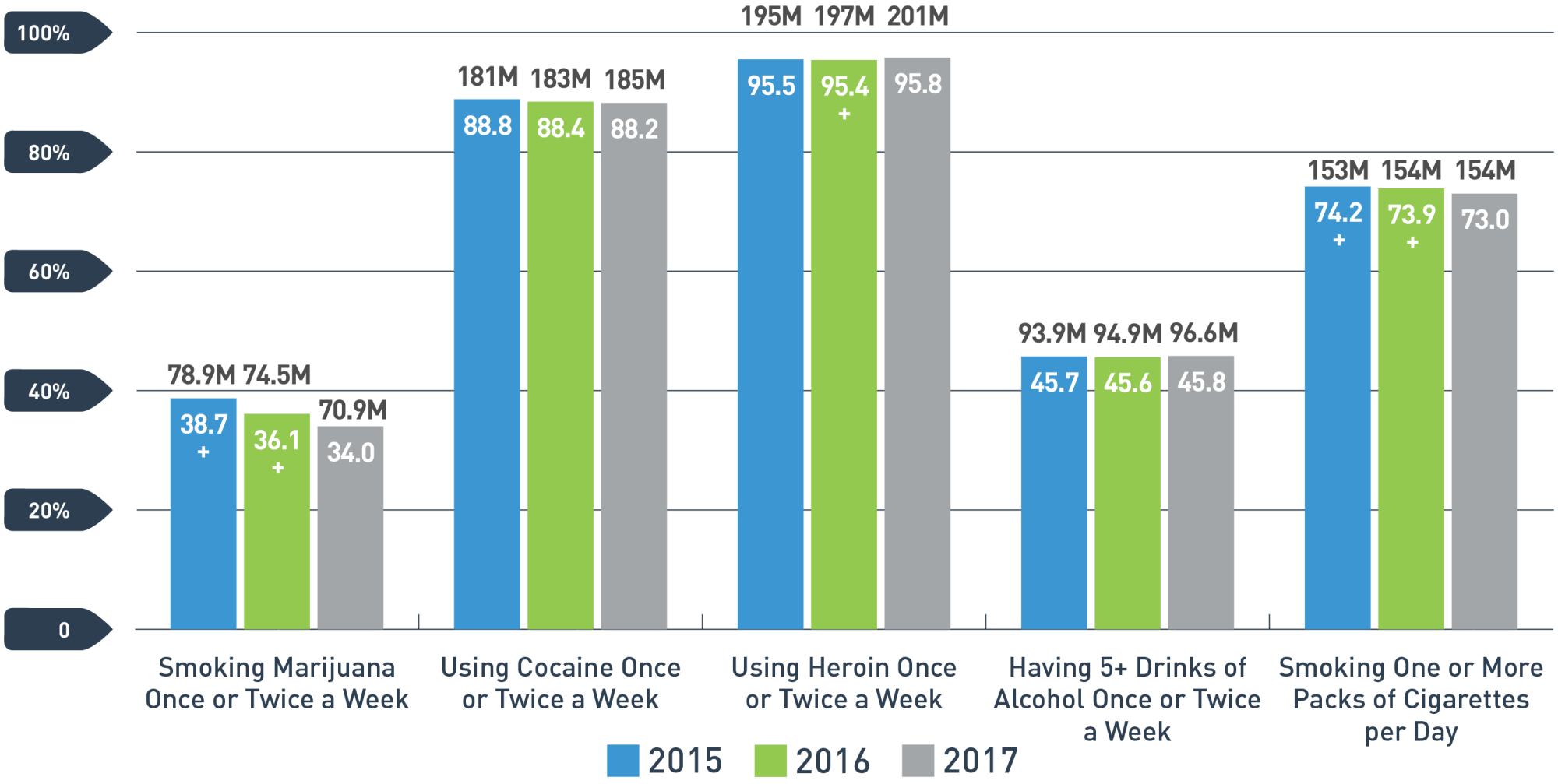
Perceptions of Great Risk of Harm From Substance Use Among Adults Aged 26 or Older

PAST YEAR, 2015 - 2017, 26+



See table 3.1 in the 2016 and 2017 NSDUH detailed tables for additional information.

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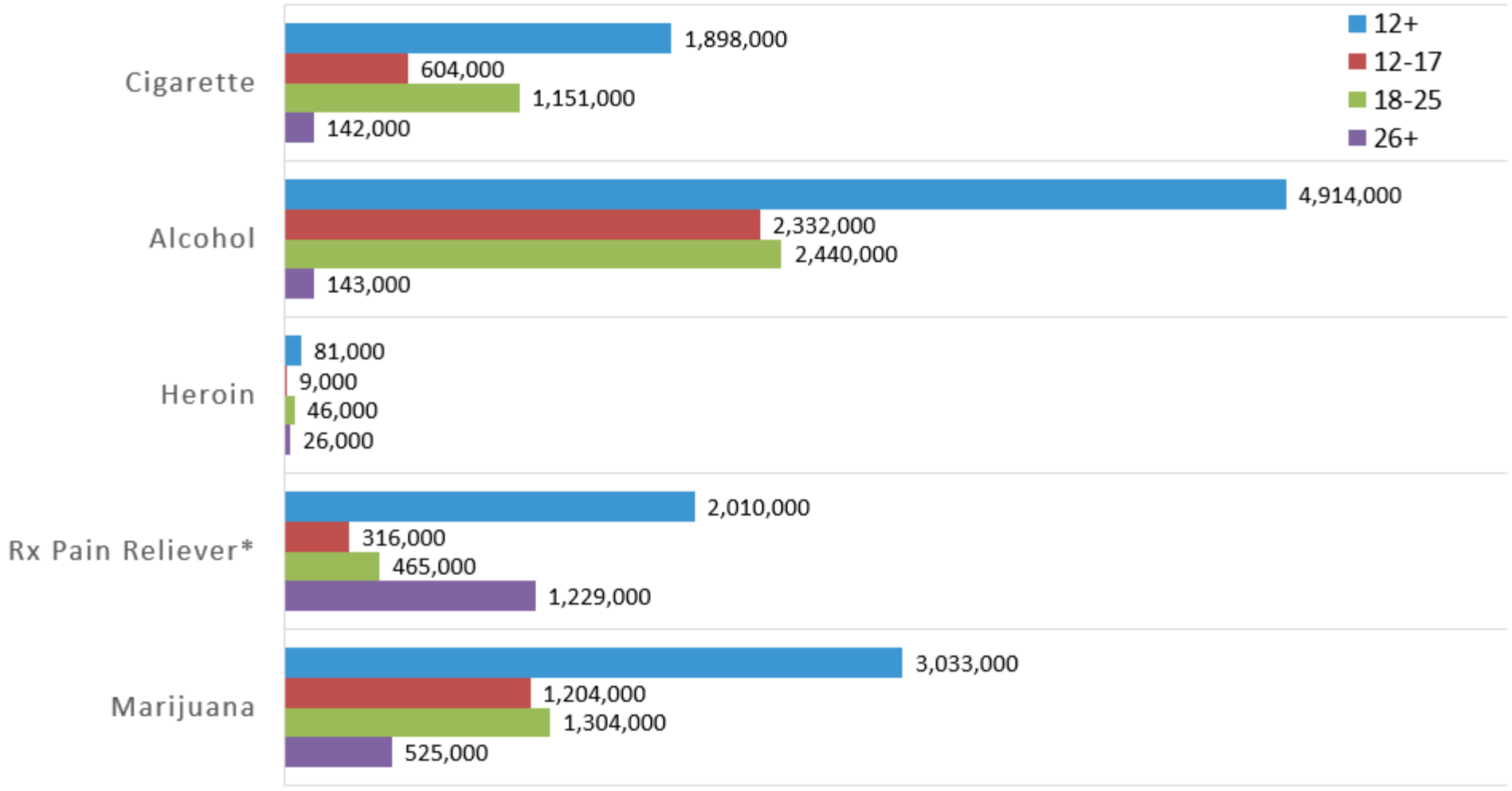
Past Year Initiates, Age Group & Substance

PAST YEAR, 2017, 12+



* Initiation of misuse

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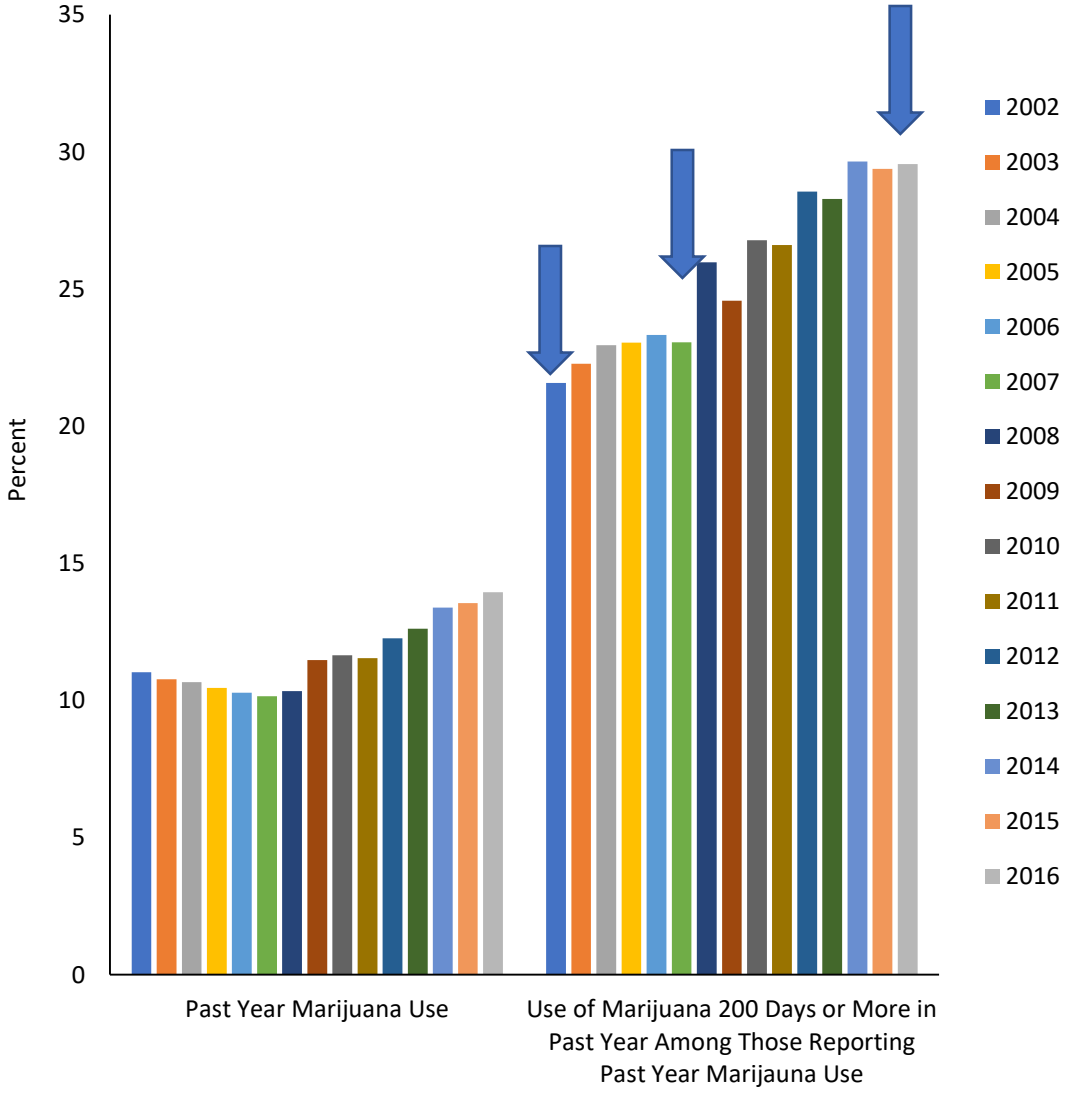
Marijuana Use Is Increasing in the U.S.



- Since 2007, past year marijuana use has increased 37%
- Frequent marijuana use (using ≥ 200 days in the past year) increased 37% since 2002
- Nearly 1 in 3 people using marijuana in 2016 reported using ≥ 200 days in the past year

Source: Jones CM Analysis of the NSDUH 2002-2016 Public Use Files

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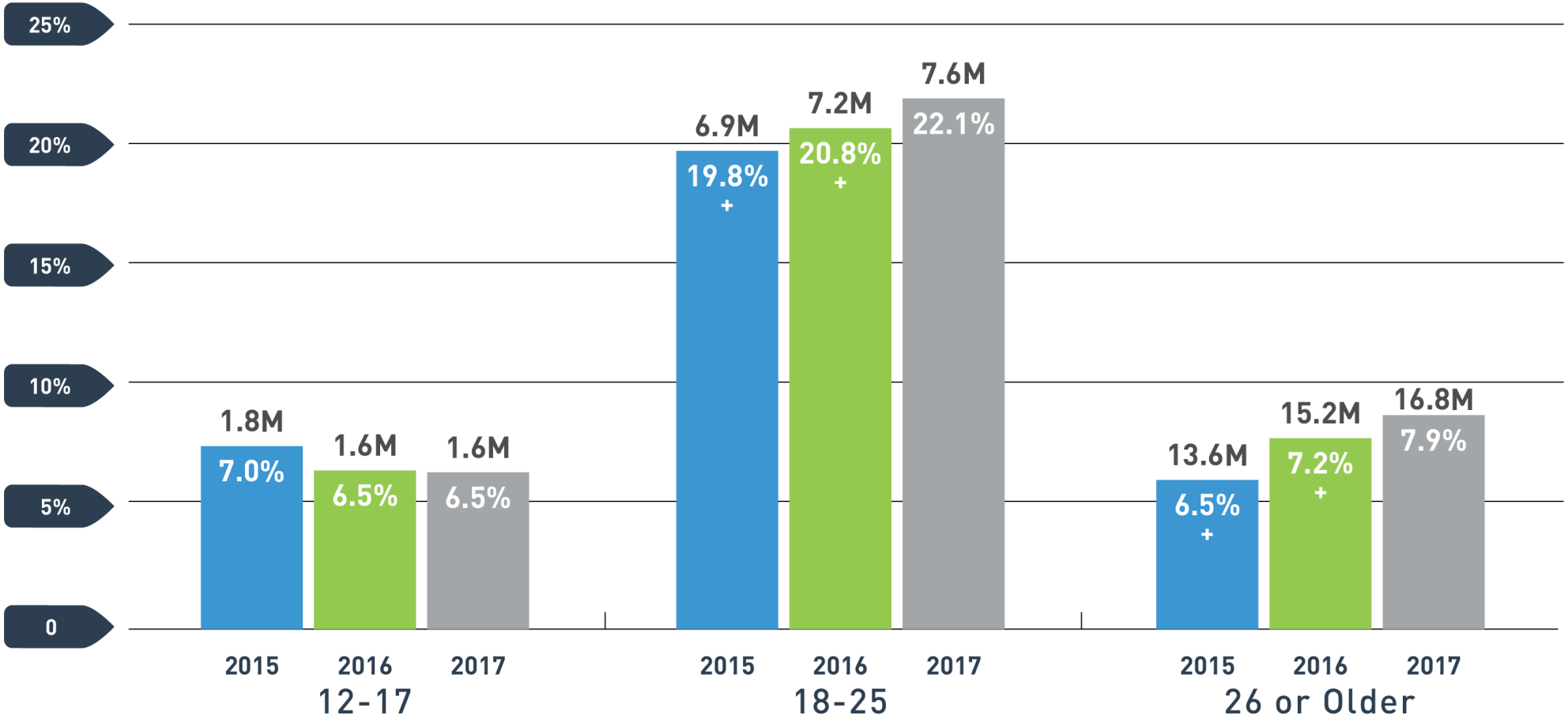
Marijuana Use

PAST MONTH, 2015 - 2017, 12+



See figure 13 in the 2017 NSDUH Report for additional information.

+ Difference between this estimate and the 2017 estimate is statistically significant at the .05 level.

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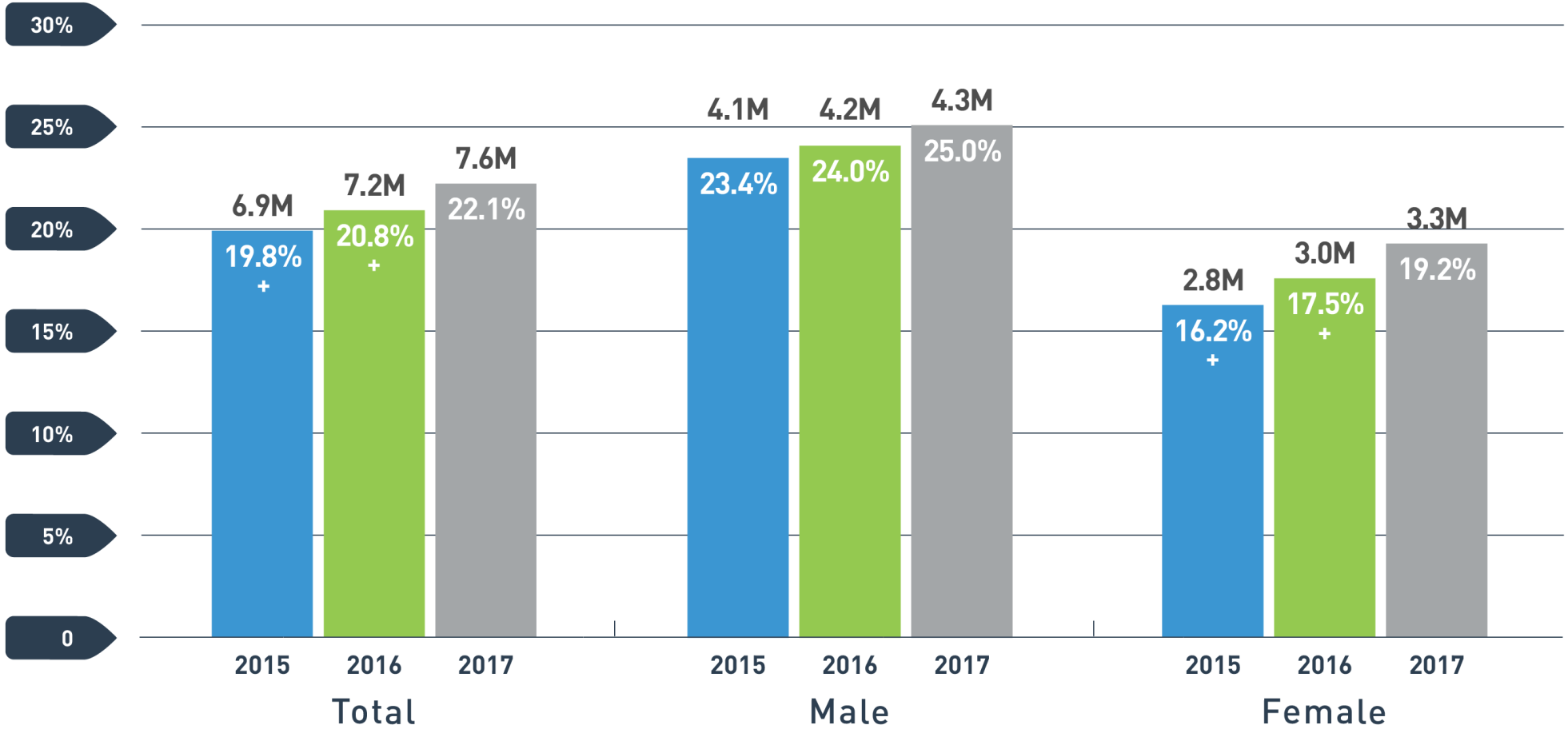
Marijuana Use among Young Adults: Significant Increases in Women

PAST MONTH, 2015 - 2017, 18 - 25



Special analysis of the 2017 NSDUH Report.

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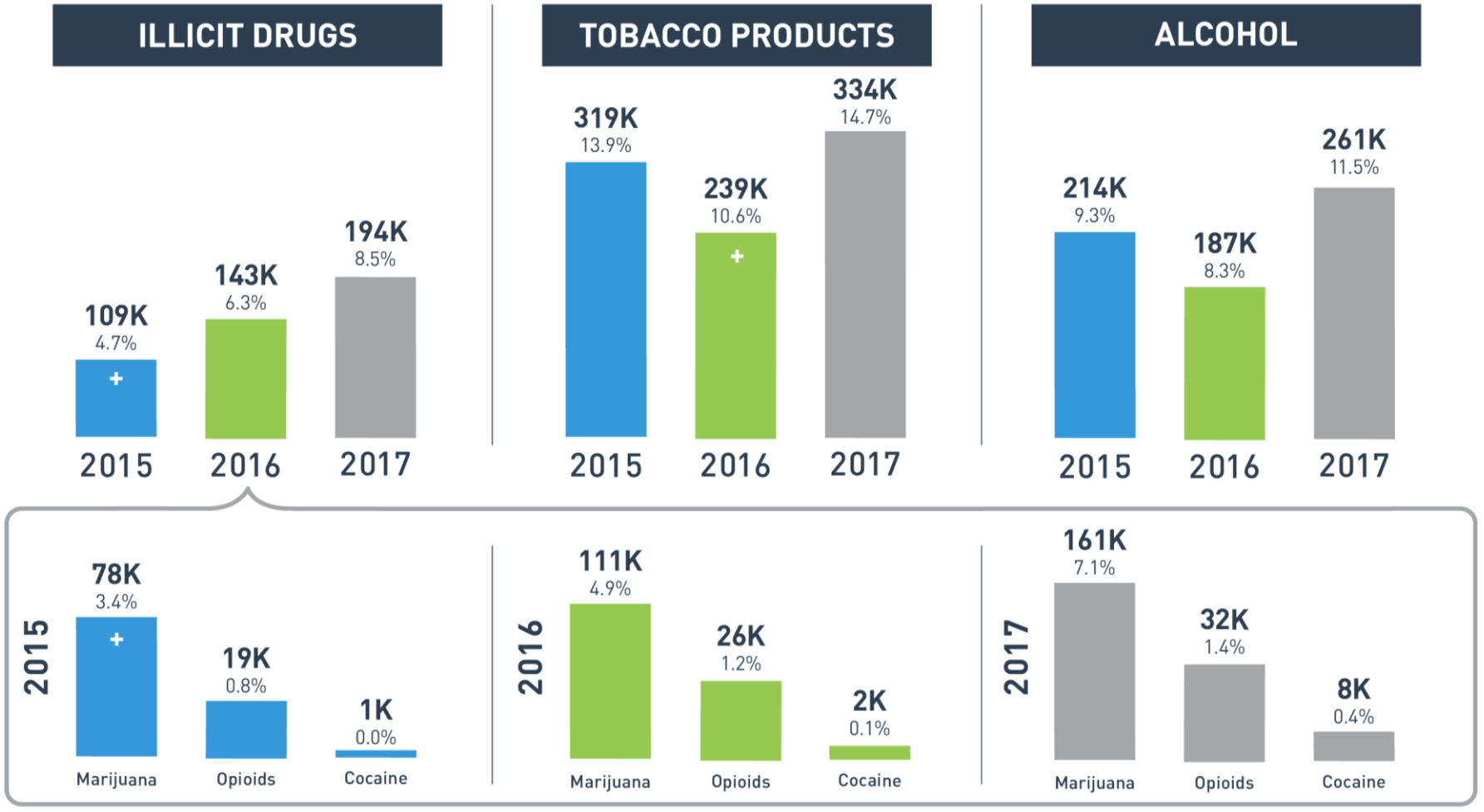
Substance Use in Past Month Among Pregnant Women

PAST MONTH, 2015 - 2017, 15 - 44



Special analysis of the 2017 NSDUH Report.

+ Difference between this estimate and the 2017 estimate is statistically significant at the .05 level.

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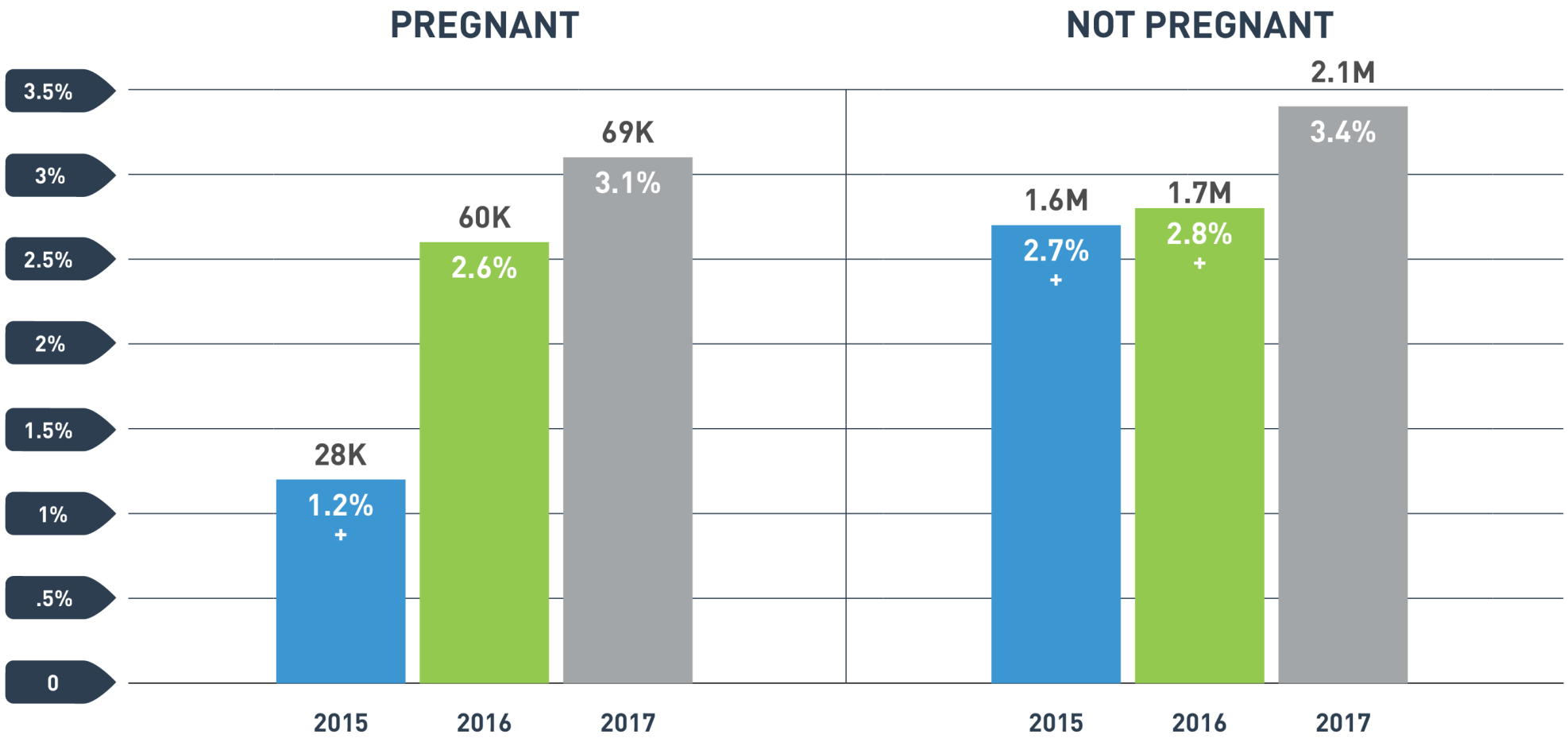
Daily or Almost Daily Marijuana Use among Women by Pregnancy Status

PAST YEAR, 2015 - 2017, 15 - 44



Special analysis of the 2017 NSDUH Report.

+ Difference between this estimate and the 2017 estimate is statistically significant at the .05 level.

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Why is this Data Important?

Marijuana and Pregnancy

May be associated with:

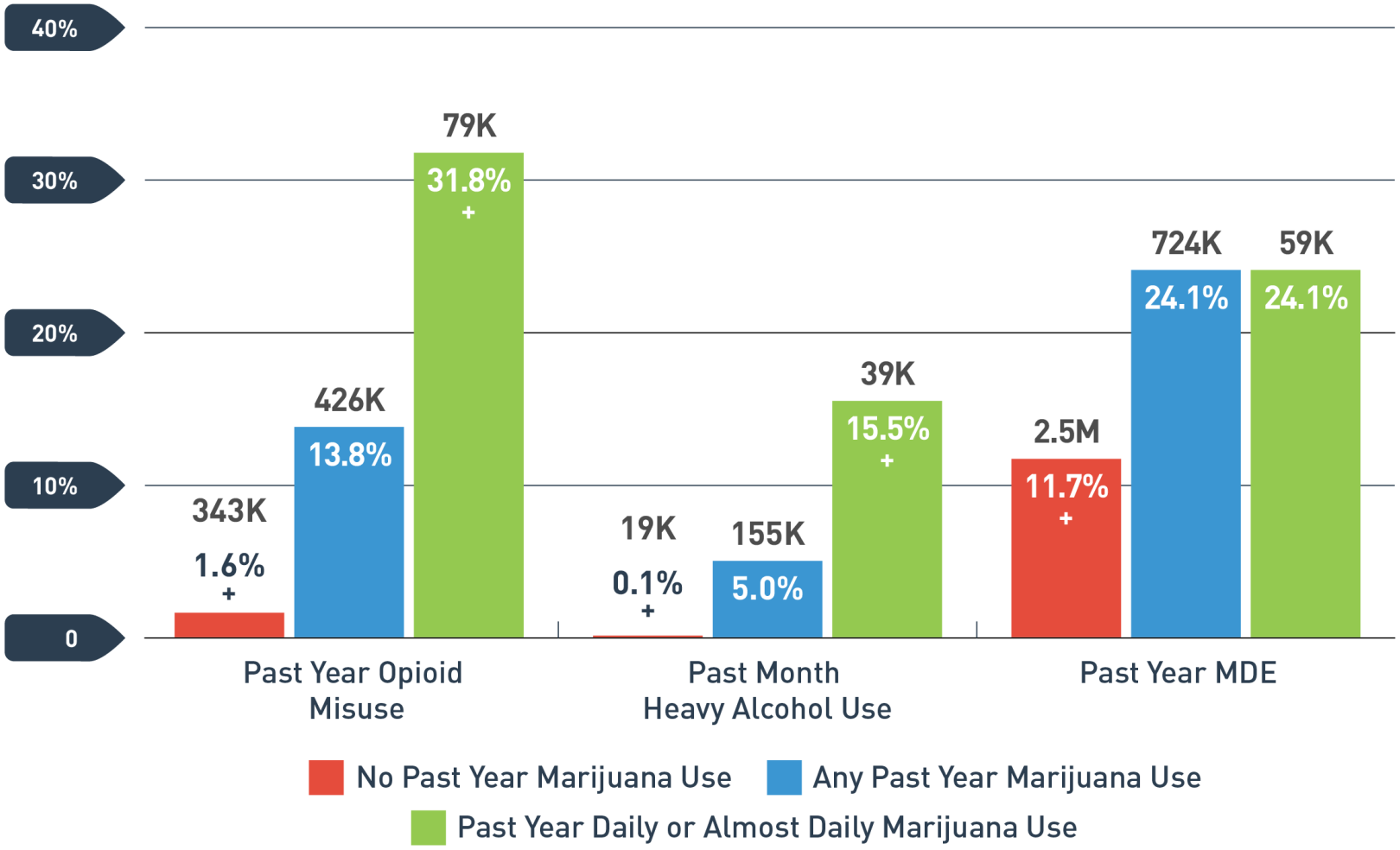
- Fetal growth restriction
- Stillbirth
- Preterm birth

May cause problems with neurological development:

- Hyperactivity
- Poor cognitive function *(Metz TD and Stickrath EH, 2015)*

Co-Occurring Disorders: Youth Opioid Misuse, Heavy Alcohol Use, and Major Depressive Episode (MDE) by Marijuana Use Status

PAST YEAR/MONTH, 2017, 12 - 17



Special analysis of the 2017 NSDUH Report.

+ Difference between this estimate and the estimate youth with past year marijuana use is statistically significant at the .05 level.

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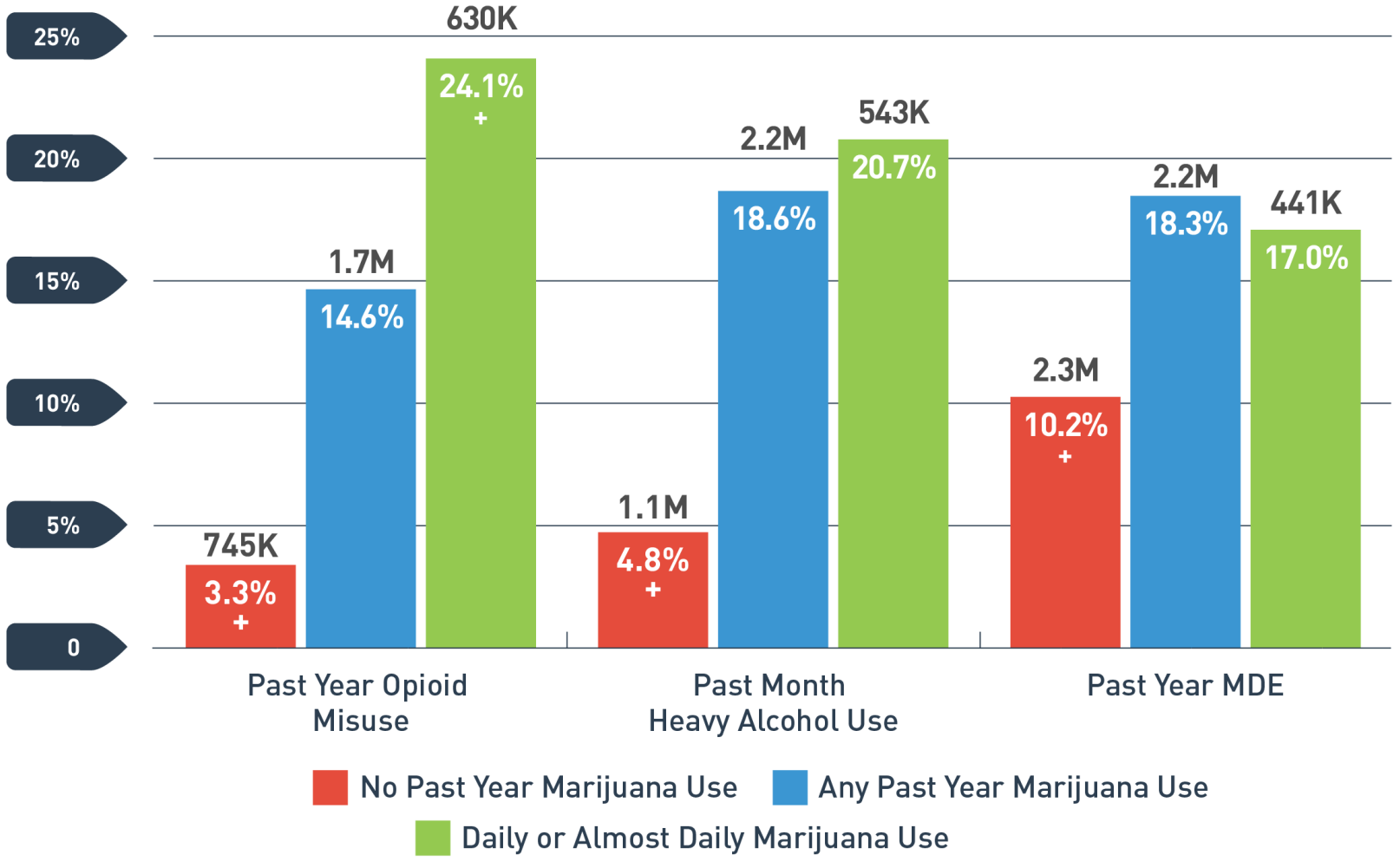
Co-Occurring Disorders: Young Adult Opioid Misuse, Heavy Alcohol Use, and Major Depressive Episode by Marijuana Use Status

PAST YEAR/MONTH, 2017, 18 - 25



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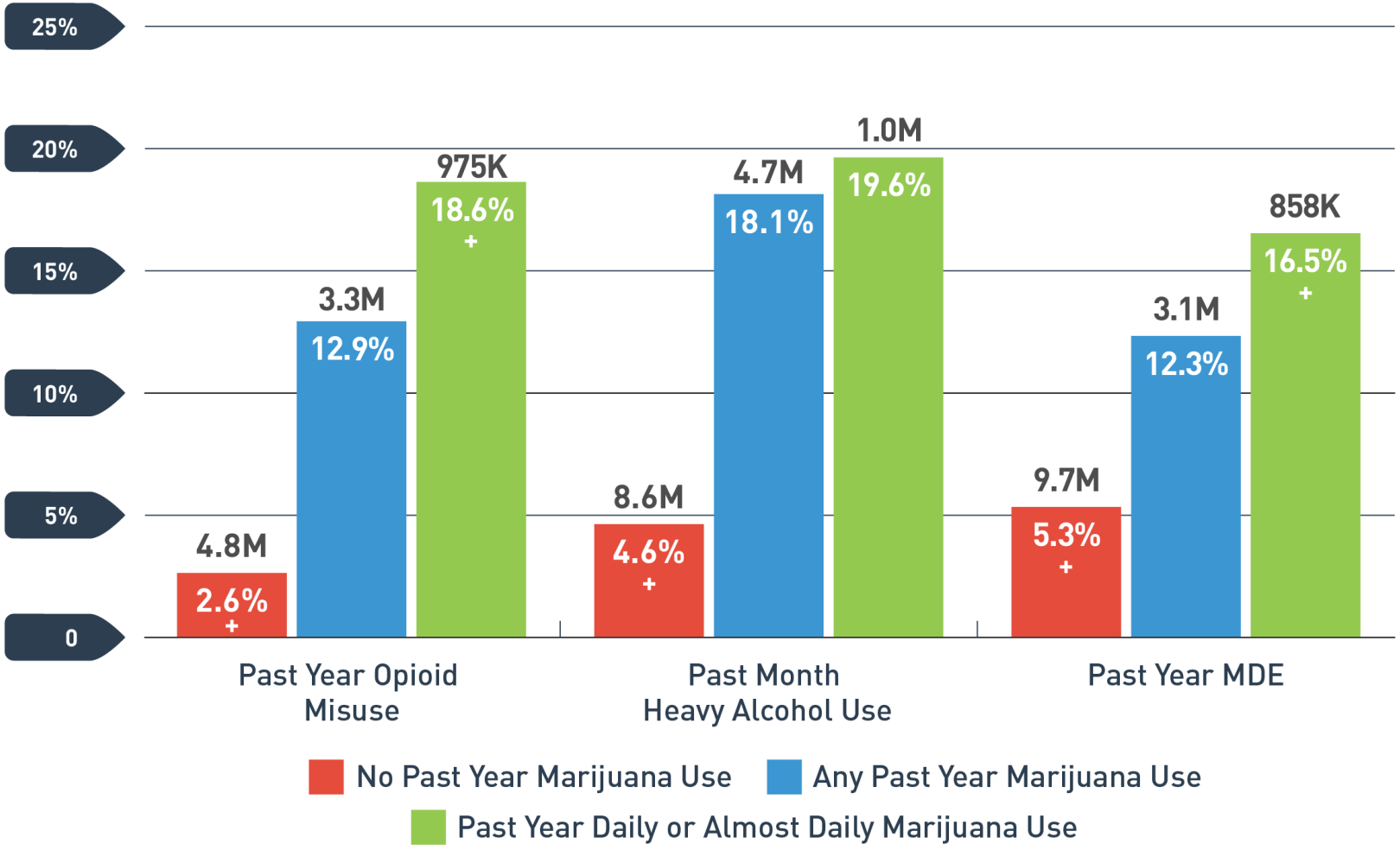
Co-Occurring Disorders: Adult Opioid Misuse, Heavy Alcohol Use, and Major Depressive Episode by Marijuana Use Status

PAST YEAR/MONTH, 2017, 26+



Special analysis of the 2017 NSDUH Report.

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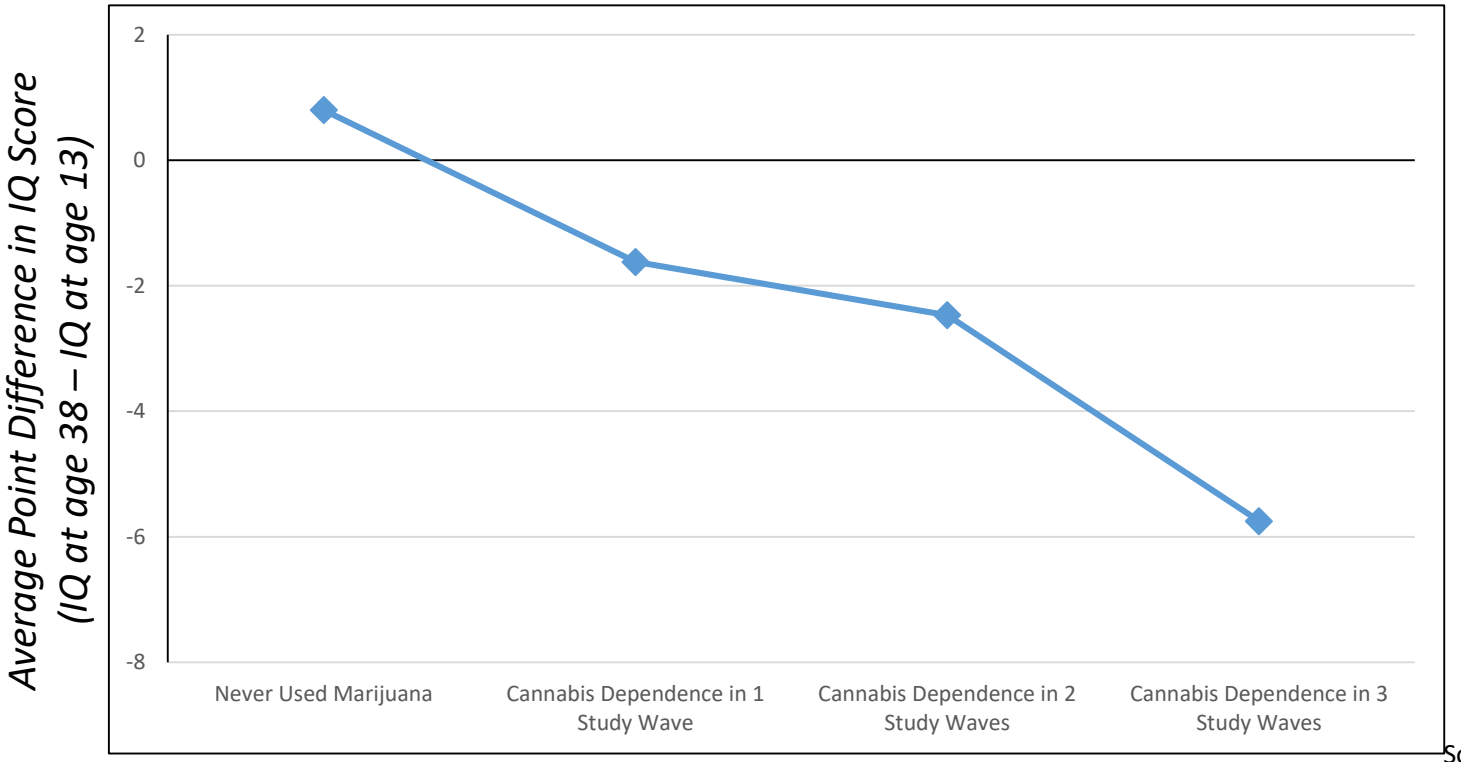
Intelligence:
PERSISTENT CANNABIS (MARIJUANA) USE DISORDER LINKED TO SIGNIFICANT IQ DROP BETWEEN CHILDHOOD AND MIDLIFE

- Followed 1,037 individuals from birth to age 38.
- Tested marijuana use and disorders at 18, 21, 26, 32 and 38 years of age.
- Tested for IQ at ages 13 and 38



All groups started with roughly equivalent IQ scores at age 13

By age 38, those who were diagnosed with cannabis dependence in 3 study waves (the most persistent users of cannabis) had lost nearly 6 IQ points by the age of 38

There was a consistent dose-response relationship across the groups

Source: Meier MH et al., PNAS Early Edition 2012

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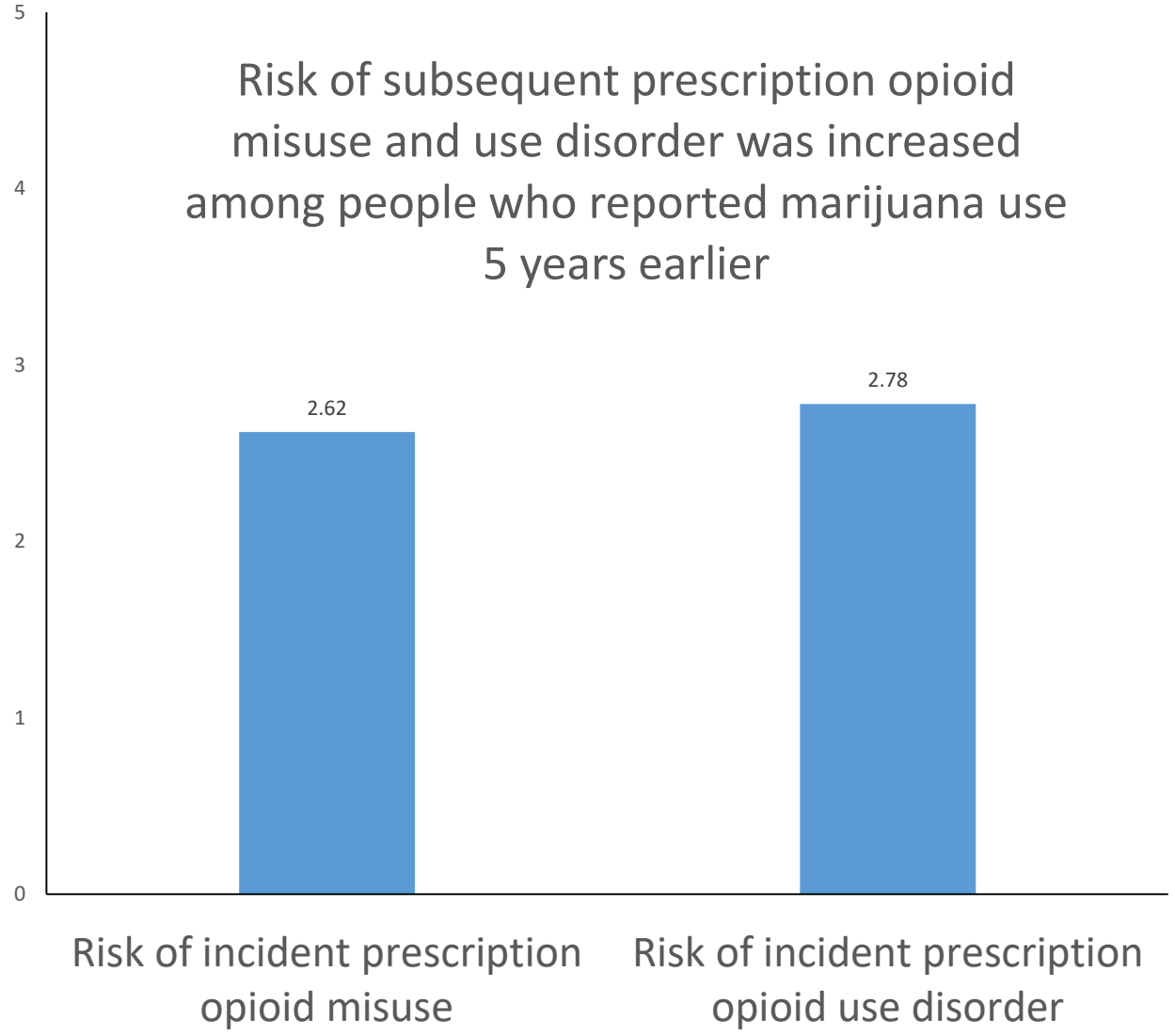
Marijuana Use: Link to Prescription Pain Medication (Opioid) Abuse

Association of marijuana use with abuse of prescription pain medications and addiction



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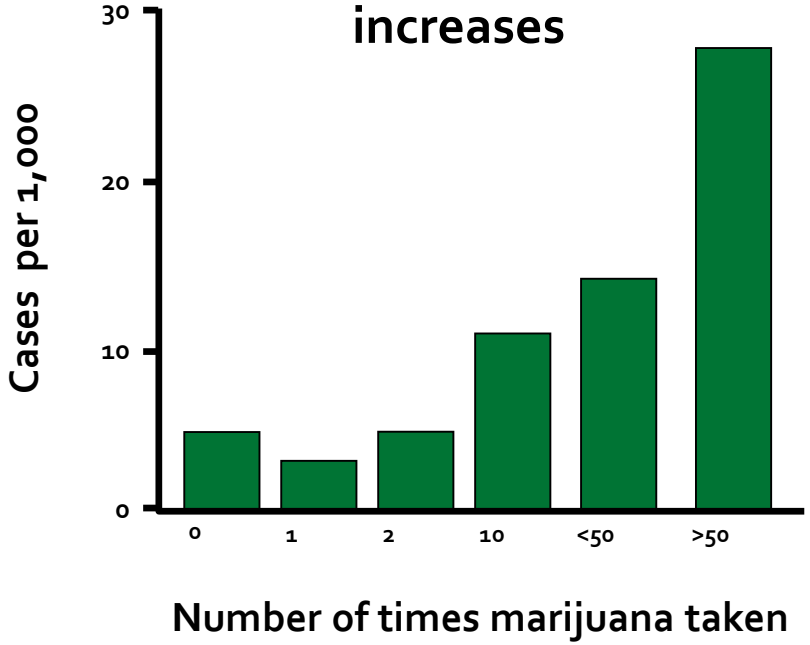
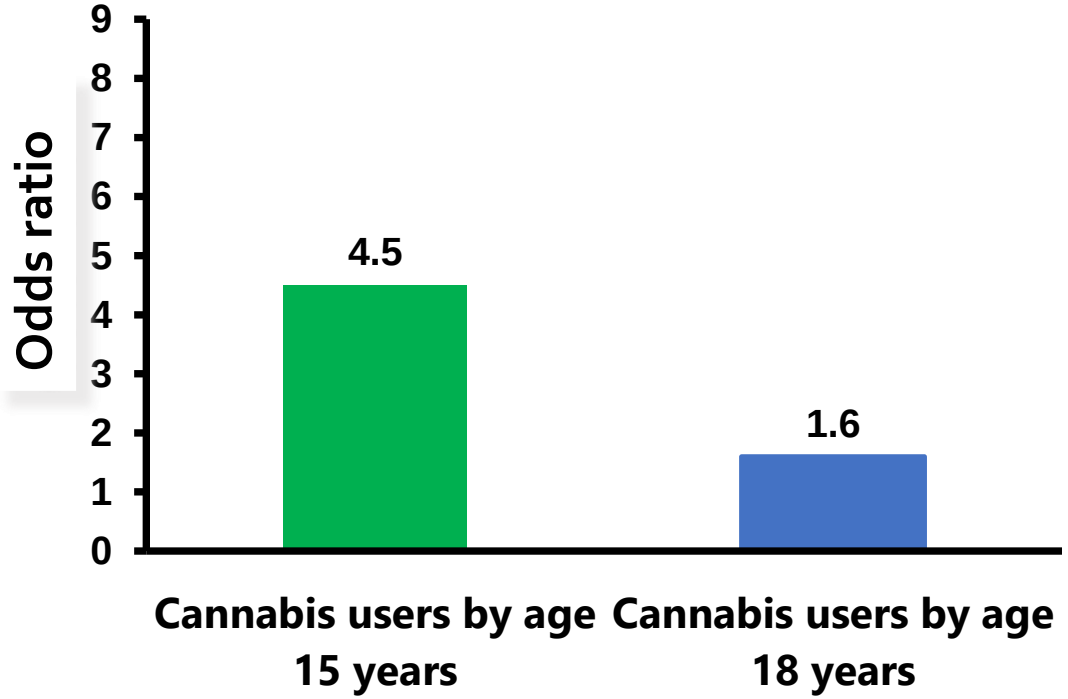
Marijuana-Associated Psychosis

Risk of schizophrenia increases as marijuana use increases



Source: Andréasson et al Lancet, 1987.

Higher risk of schizophrenia-like psychosis with younger age of first marijuana use



Source: Arseneault et al BMJ, 2002

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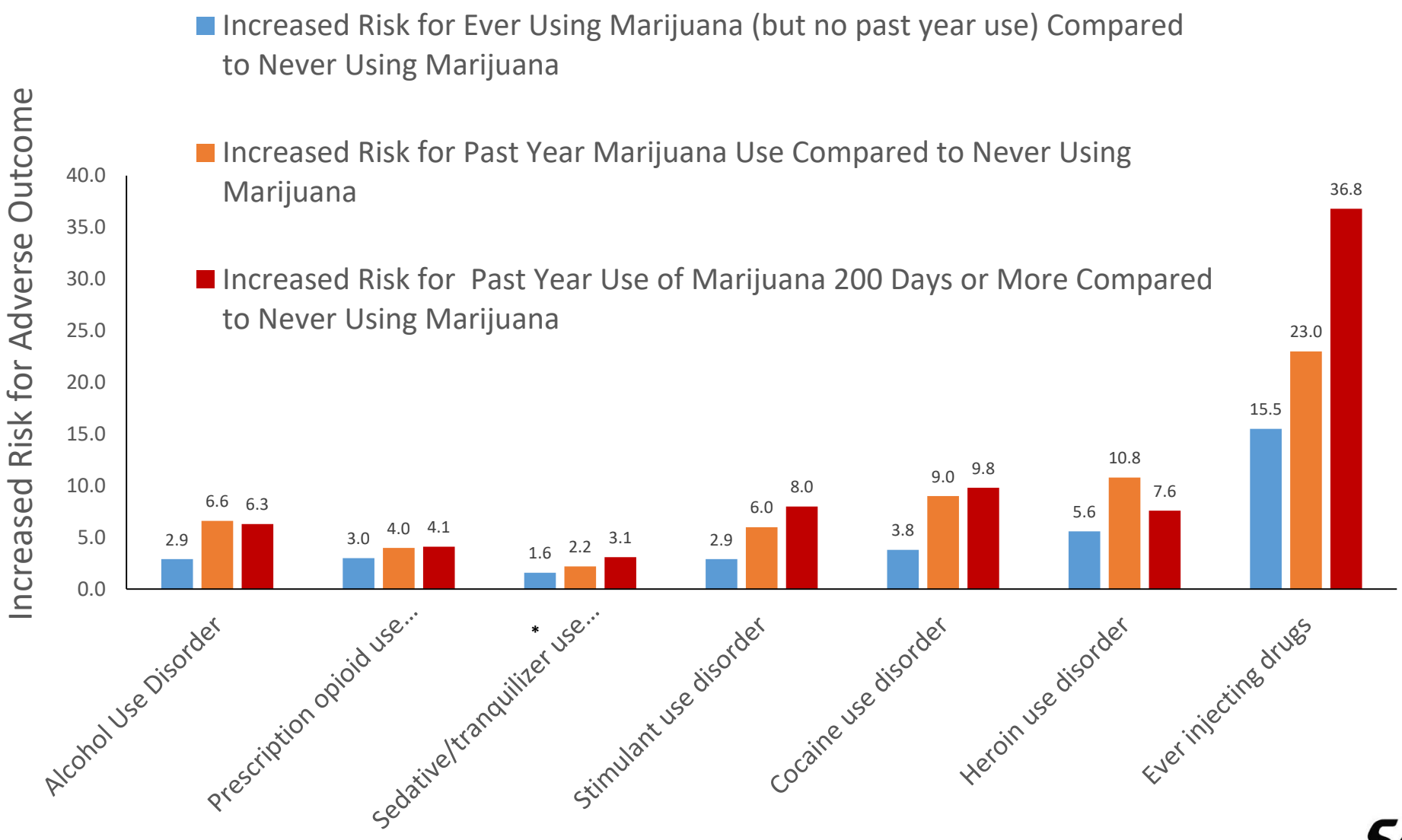
Drug Risks Associated with Marijuana Use Among U.S. Adults 18 and Older



Source: Jones CM Analysis of 2015-2016 NSDUH Public Use File Data

*** Result is not statistically significantly different**

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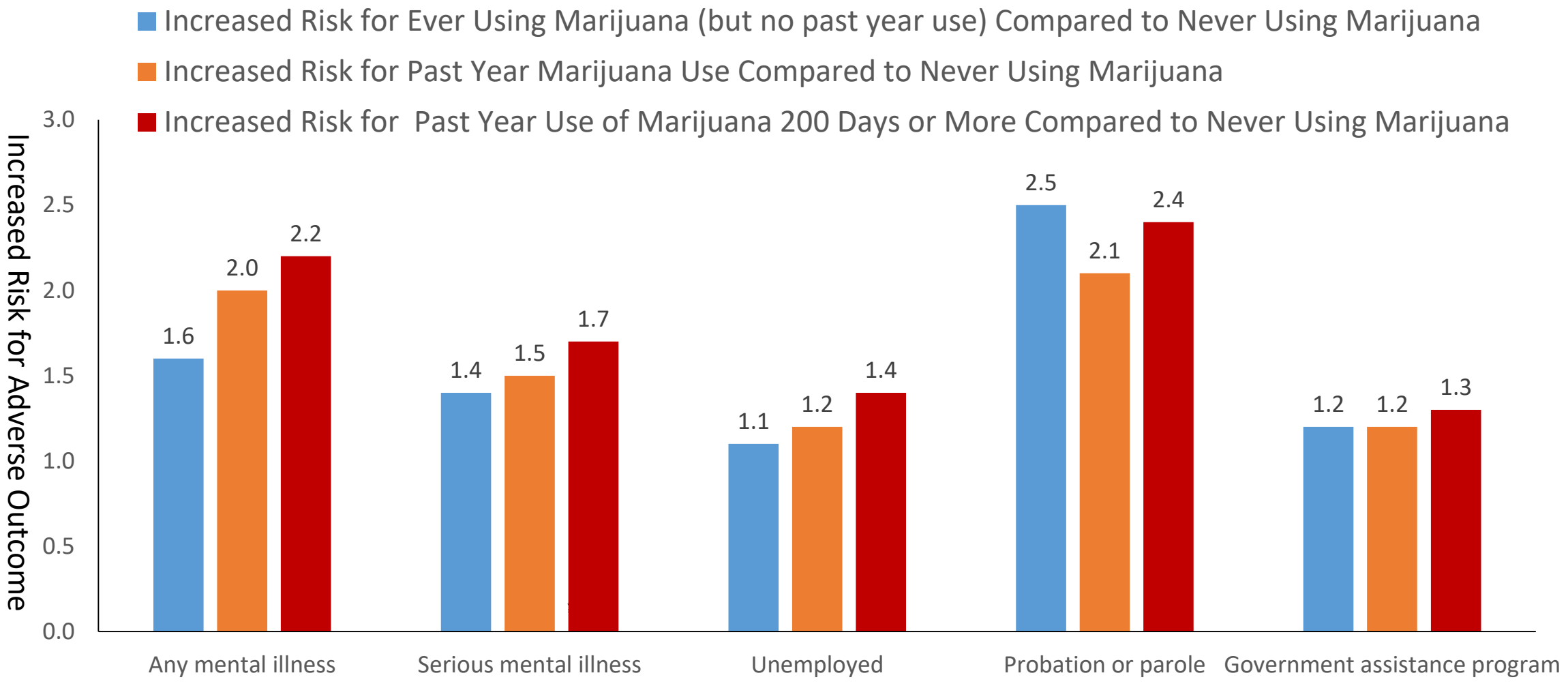
Mental Health and Social Risks of Marijuana Use Among U.S. Adults 18 and Older



* **Result is not statistically significantly different**

Source: Jones CM Analysis of 2015-2016 NSDUH Public Use File Data

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Summary: Consequences of Marijuana Use

Acute, intoxicating effects of marijuana:

- Distorts perception; poor judgment and poor decision making (e.g.: unprotected sex, driving while intoxicated)
- Impairment in balance and coordination (important to injury risk in activities such as driving, sports)
- Difficulty with attention, concentration, and problem solving
- Difficulty with learning and memory (immediate and recall)

Adverse outcomes linked to marijuana use by youth:

Poor school performance and increased drop out rates

Chronic use in adolescence has been linked to decline in IQ that may not recover with cessation (Meier et al. 2012)

Marijuana use in adolescence is associated with an increased risk for later psychotic disorder in adulthood (D'Souza, et al. 2016)

Marijuana use linked to earlier onset of psychosis in youth known to be at risk for schizophrenia (McHugh, et al. 2017)

Summary: Consequences of Marijuana Use

- Significant numbers who try marijuana will become addicted (Lopez-Quintero, et al. 2011)
- Higher overall rates of car crashes in states that have legalized (WAPO, June 2017)
- Association of marijuana use with abuse of prescription pain medications (Olfson et al. 2017)

Is There Medical Use for Marijuana?

- Evidence for some medical value of some components
  - CBD and seizure disorder (Dravet's syndrome and Lennox-Gastaut syndrome)
  - THC products for wasting illnesses and appetite production

- Medications must have undergone substantial research to answer critical questions before getting to market and widespread use in humans:
    - Isolation of single components; manufacture processes
    - Delivery mechanism
    - Pharmacokinetics/pharmacodynamics
    - Dose-response relationships (e.g.: doubling a dose may or may not double the effect)
    - Therapeutic range
    - Adverse events: what are they and how best to avoid/address should they occur?
  - These types of studies would be difficult for marijuana because there are so many components

Where Do We Go From Here?

- Government has a responsibility to inform Americans of the risks of marijuana use
- People need to be able to make informed choices
- States should consider short and long term issues related to marijuana
  - Tax revenue
  - Societal costs
  - Government costs

Major Issue to Consider: Marijuana has gotten ahead of regulation

- How do we define intoxication?
- What are the 'legal limits' of use (equivalent to BAC)
- How should marijuana sales centers be regulated (should we better control the opening of marijuana sales locations?)
- Should warning labels be required on marijuana products?
- How do we assure that underage sales are not occurring? (as with tobacco products, for example)
- Should people be allowed to openly use in public?
- Should people be allowed to use and operate motor vehicles?
- What are the penalties?

New Stimulant Toxicity: Fentanyl-Contaminated Cocaine

Cocaine laced with fentanyl:

7% of cocaine seized in New England in 2017 was contaminated with fentanyl

Connecticut: deaths involving fentanyl-laced cocaine up 420% in last 3 years

Reported increases in deaths in NYC, PA, MA, NJ, OH, CA

https://www.ncadd.org/blogs/in-the-news/cocaine-laced-with-fentanyl-causing-growing-number-of-deaths

Why?

Poor quality control in packaging?

High Risk Groups:

Primary cocaine users

Opioid users may use cocaine to counteract sedation/intensify effect of opioid

- Underscores the need to warn the public and provide treatment for cocaine use disorders
- Epidemic is not just about opioid addiction

Cocaine users lack opioid tolerance: fentanyl overdose/death more likely

- Naloxone
- Discourage use alone

https://www.npr.org/sections/health-shots/2018/03/29/597717402/fentanyl-laced-cocaine-becoming-a-deadly-problem-among-drug-users

Kratom

- Kratom is a tropical tree (*Mitragyna speciose)* native to Southeast Asia, used traditionally to combat fatigue and improve work productivity among farm populations in Southeast Asia

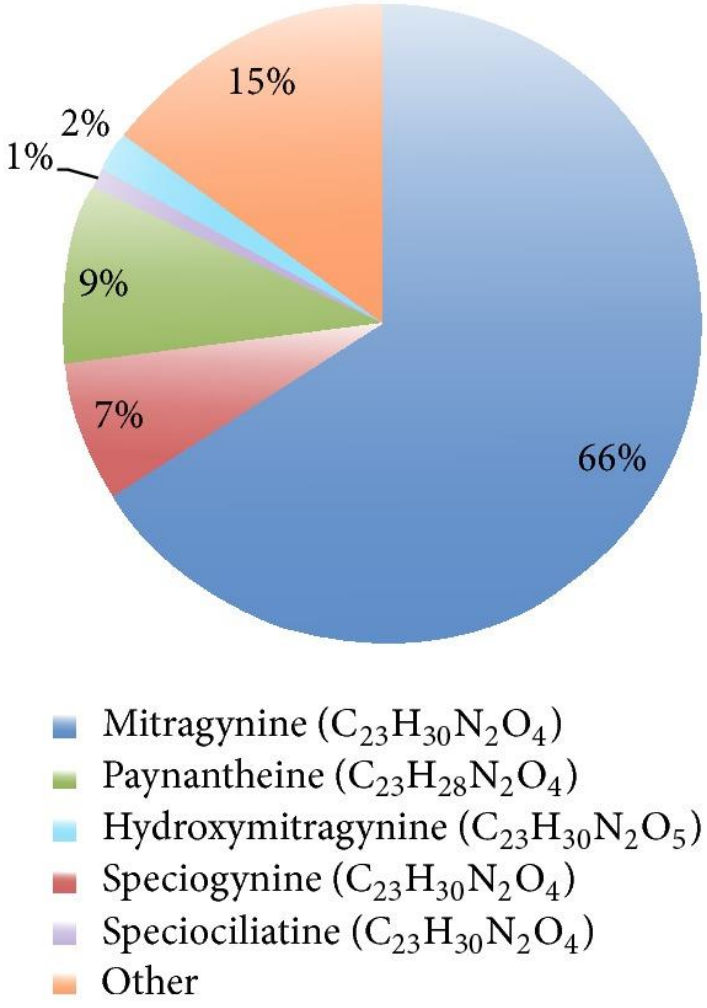
- Has recently become popular as a novel psychoactive substance in Western countries (*Cinosi et al, 2015*).

- FDA is concerned that kratom, which affects the same opioid brain receptors as morphine, appears to have properties that expose users to the risks of addiction, abuse, and dependence

- Currently, there are no FDA-approved uses for kratom, and the agency has received concerning reports about its safety

Kratom Extract Composition

- Kratom preparations contain varying amounts of several phytochemicals, making their pharmacological and toxicological evaluation unique and difficult.
- More than 20 alkaloids in kratom have been identified in the laboratory.
- Mitragynine is classified as a kappa-opioid receptor agonist and is roughly 13 times more potent than morphine.
- Mitragynine/OH-mitragynine thought to be responsible for the opioid-like effects.



Source: Cinosi E.; Martinotti; et all. Following "the Roots" of Kratom (Mitragyna speciosa): The Evolution of an Enhancer from a Traditional Use to Increase Work and Productivity in Southeast Asia to a Recreational Psychoactive Drug in Western Countries; Biomed Res Int. 2015; 2015: 968786

Kratom: How Used

- Capsules
- Pills
- Extract
- Leaves
  - Chewed
  - Brewed as tea
  - Smoked

Kratom: Effects

The effects of kratom in humans are dose-dependent:

- Small doses produce stimulatory effects resembling the stimulant effect of drugs such as cocaine or amphetamines.
- Larger dosages associated with sedative-narcotic, pain reducing effects that resemble drugs such as opiates.
- Regular kratom use is associated with addictive disorders, as evidenced by craving and compulsive use. Opioid withdrawal symptoms upon cessation.

SOURCE: Prozialeck W. C., Jivan J. K., Andurkar S. V. Pharmacology of Kratom: an emerging botanical agent with stimulant, analgesic and opioid-like effects. Journal of the American Osteopathic Association. 2012;112(12):792–799; Singh, 2014; Suwanlert, 1975; Ahmad and Aziz, 2012; Vicknasingam et al., 2010; Singh et al., 2014

Use of Kratom in the US

- An anonymous online survey was conducted in October 2016 of 10,000 current kratom users through available social media and from the American Kratom Association (https://speciosa.org/home/)

- 8,049 respondents completed the survey.

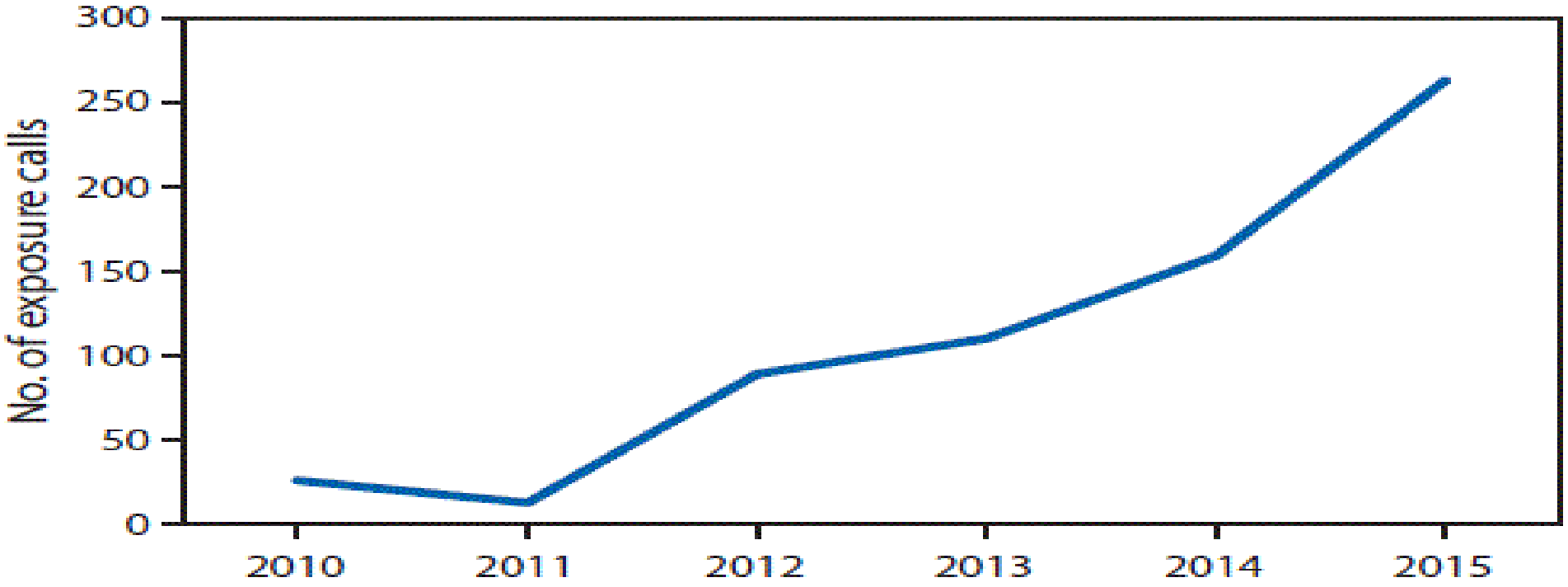
- Findings:

  - Kratom was primarily used by a middle-aged (31-50 years) males (56.91%) with income $35,000 or higher with private insurance (61.31%).
  - Kratom was used to self-treat pain (68%) and emotional or mental conditions (66%) and for withdrawal symptoms associated with prescription opioid use.
  - Subjects reported dose-dependent nausea and constipation with high doses (5g) and with and frequent dosing (Q22 doses/wk).

SOURCE: Grundmann O.; Patterns of kratom use and health impact in the USVresults from an online survey. Drug Alcohol Depend. 2017; 175(5):63Y70.

Number of Kratom-related Reported Exposure Calls to Poison Centers in the US

National Poison Data System - United States and Puerto Rico
January 2010–December 2015



SOURCE: Anwar M, Law R, Schier J. Notes from the Field. Kratom (Mitragyna speciosa) Exposures Reported to Poison Centers — United States, 2010–2015. MMWR Morb Mortal Wkly Rep 2016;65:748–749. DOI: http://dx.doi.org/10.15585/mmwr.mm6529a4

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Fatal Overdoses Involving Kratom

From July 2016 to June 2017, 25 fatal overdoses involving kratom across 8 CDC SUDORS states were identified

States	ME	NH	NM	OH	PA	RI	WV	WI	Total
Opioid overdose deaths	301	402	322	4,534	3,231	265	844	825	10,724
Deaths involving kratom	4	2	1	3	8	1	5	1	25
Percent involving kratom	1.3%	0.5%	0.3%	0.07 %	0.25 %	0.4%	0.6%	0.1%	0.23%

Caution: testing of kratom is not uniform thus these numbers are underestimates

Source: CDC SUDORS Overdose Death Data

In 2017, the Food and Drug Administration (FDA) began issuing a series of warnings about kratom and has now identified at least 44 deaths related to its use.

Most kratom associated deaths appeared to have resulted from adulterated products or taking kratom along with other potent substances.

Kratom Concerns

- Kratom has gained popularity for its euphoric effects and is being popularized as a safe herbal product capable of giving a "legal" high (*Swogger et al., 2015*), and as an alternative to other sedative and stimulant type drugs (*Warner et al., 2016*).
- Reports of physical dependence on kratom in Western nations emerge from case reports from the UK (*Boyer et al., 2008, McWhirter and Morris, 2010*), Germany (*Kapp et al., 2011*) and the US (*Dorman et al., 2014, Nelsen et al., 2010, Forrester, 2013, Sheleg and Collins, 2011*).
- It can be surmised that given the large and growing number of internet purchase sites for kratom (cited in *Cinosi et al., 2015*), addiction to kratom is also likely to be growing in the Western countries.
- No treatment specific for kratom addiction available
- One case of NAS in an infant whose mother was a kratom user and who responded to opioid treatment.

International Status of Kratom

Kratom is restricted or illegal in:

Australia	Lithuania	Romania
Denmark	Myanmar	South Korea
Finland	Malaysia	Sweden
Israel	Poland	Thailand
United Kingdom		

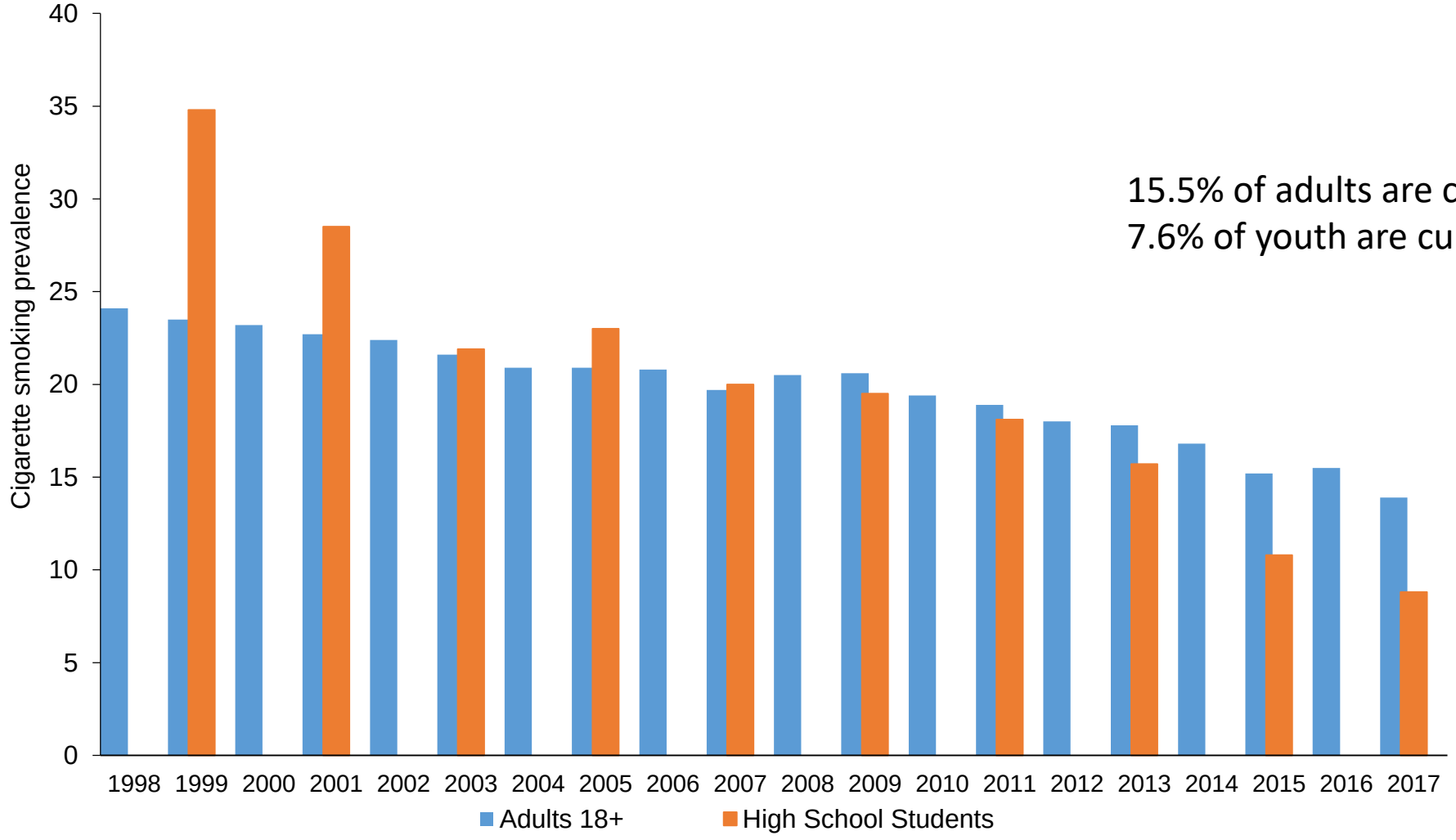
Scheduling under consideration in U.S.
On November 14, 2017, the FDA issued a public health advisory related to mounting concerns regarding the risks associated with kratom and reported deaths with use.

Conclusions

- Kratom is a recognized emerging public health threat (*MMWR. July 29, 2016;65(29):748Y749)*
- People need to understand that ‘‘legal’’ and ‘‘available’’ are not the same as ‘‘safe.’’
- In the West, kratom has been valued for its analgesic effects and to aid in managing opioid withdrawal. However, some of these individual attempts have resulted in cases of toxicity and fatalities.
- Physicians should be aware of these herbal supplements and potential toxicity or withdrawal effects in patients including in newborns which cannot be picked up by the standard toxicology screen (*Davidson et al, 2018*).
- Preventionists should be aware of this drug and work with their communities raising awareness, providing education about effects and risks.

E-cigarettes
Vaping in the US: Trends and Effects

Cigarette Smoking Continues to Decline



15.5% of adults are current smokers
7.6% of youth are current smokers

Source: Adult cigarette smoking prevalence data are from the National Health Interview Survey (NHIS).
High school cigarette smoking prevalence data are from the National Youth Risk Behavior Survey.

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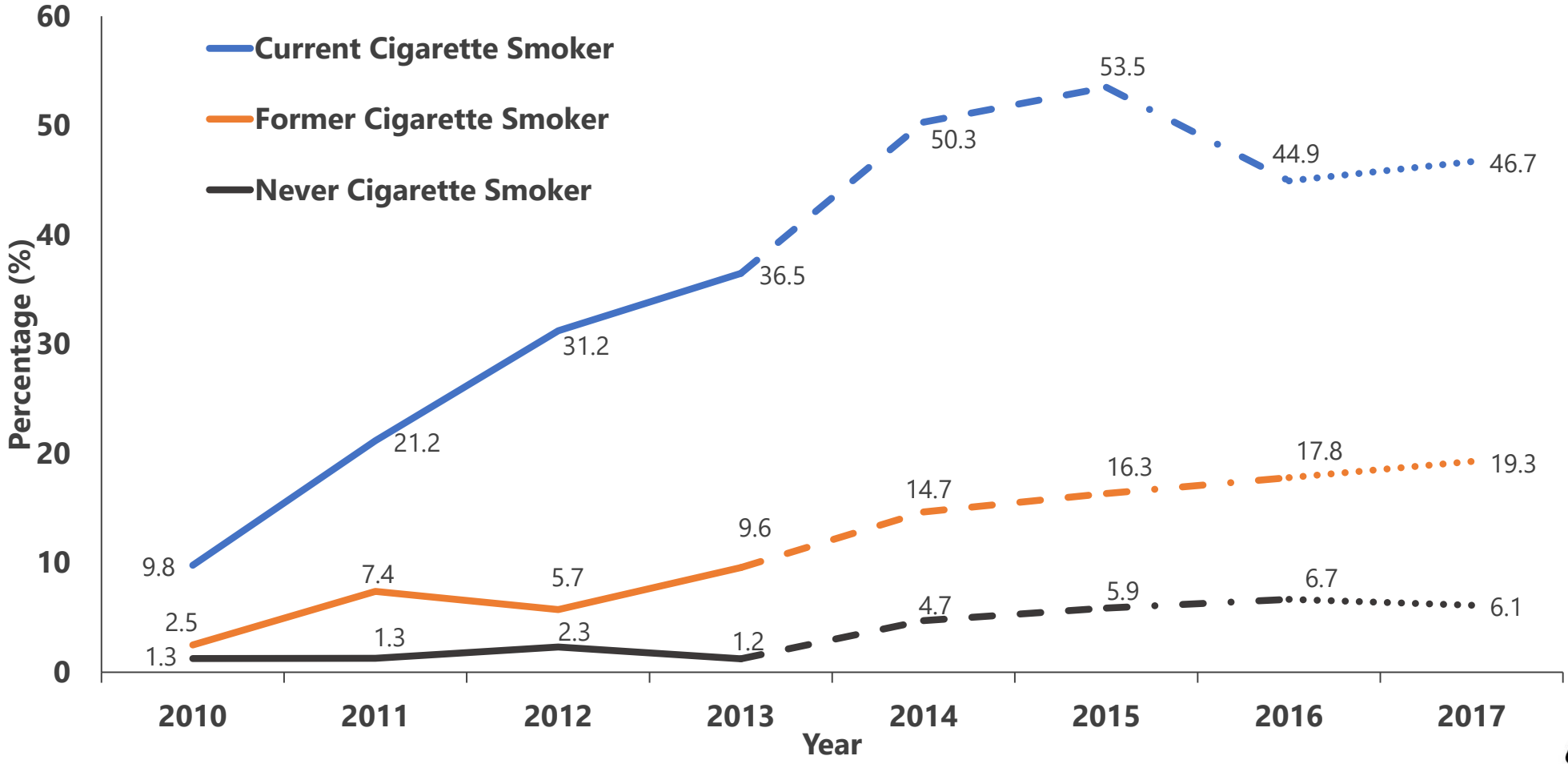
E-Cigarette Use on the Rise: Adult Ever Use of E-Cigarettes by Cigarette Smoking Status – US, 2010-2017



Source: CDC. Styles Survey. 2010-2017

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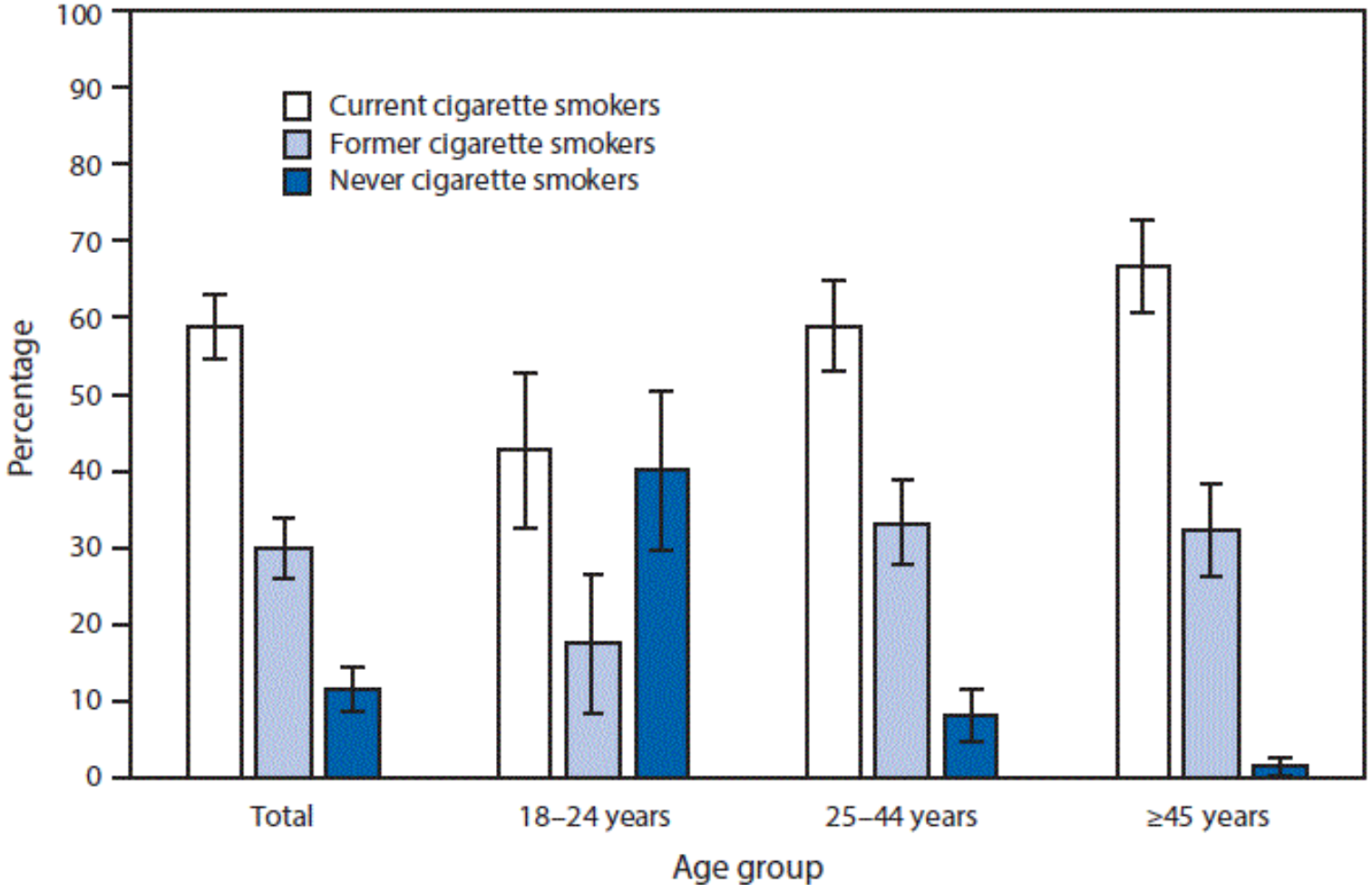
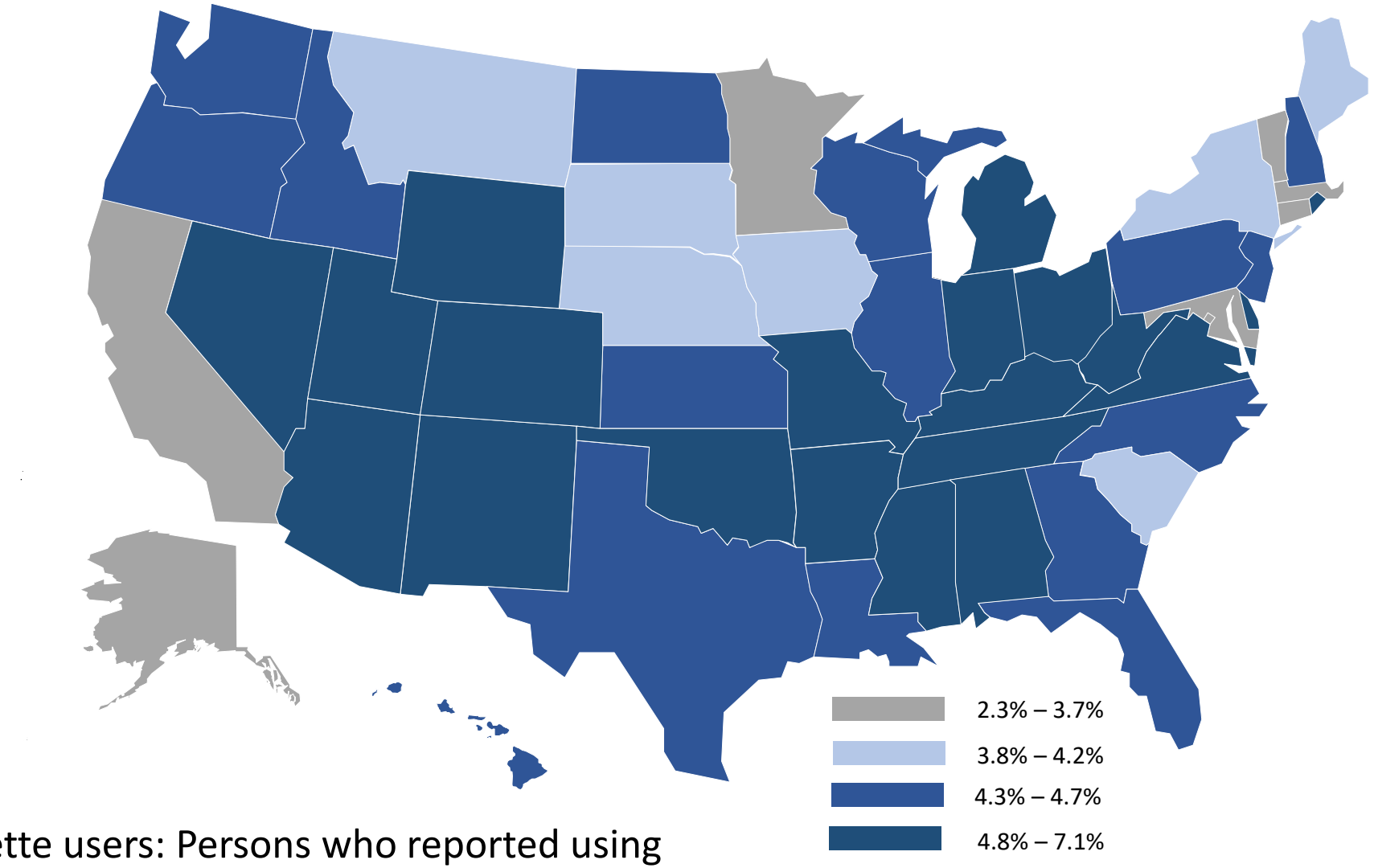
Cigarette Smoking Status Among Current Adult E-Cigarette Users, by Age Group



Source: *QuickStats:* Cigarette Smoking Status Among Current Adult E-cigarette Users, by Age Group — National Health Interview Survey, United States, 2015. MMWR Morb Mortal Wkly Rep 2016;65:1177.

Current E-cigarette Use Among U.S. Adults, BRFSS, 2017



Current e-cigarette users: Persons who reported using e-cigarettes or some other electronic "vaping" product "some days" or "every day"

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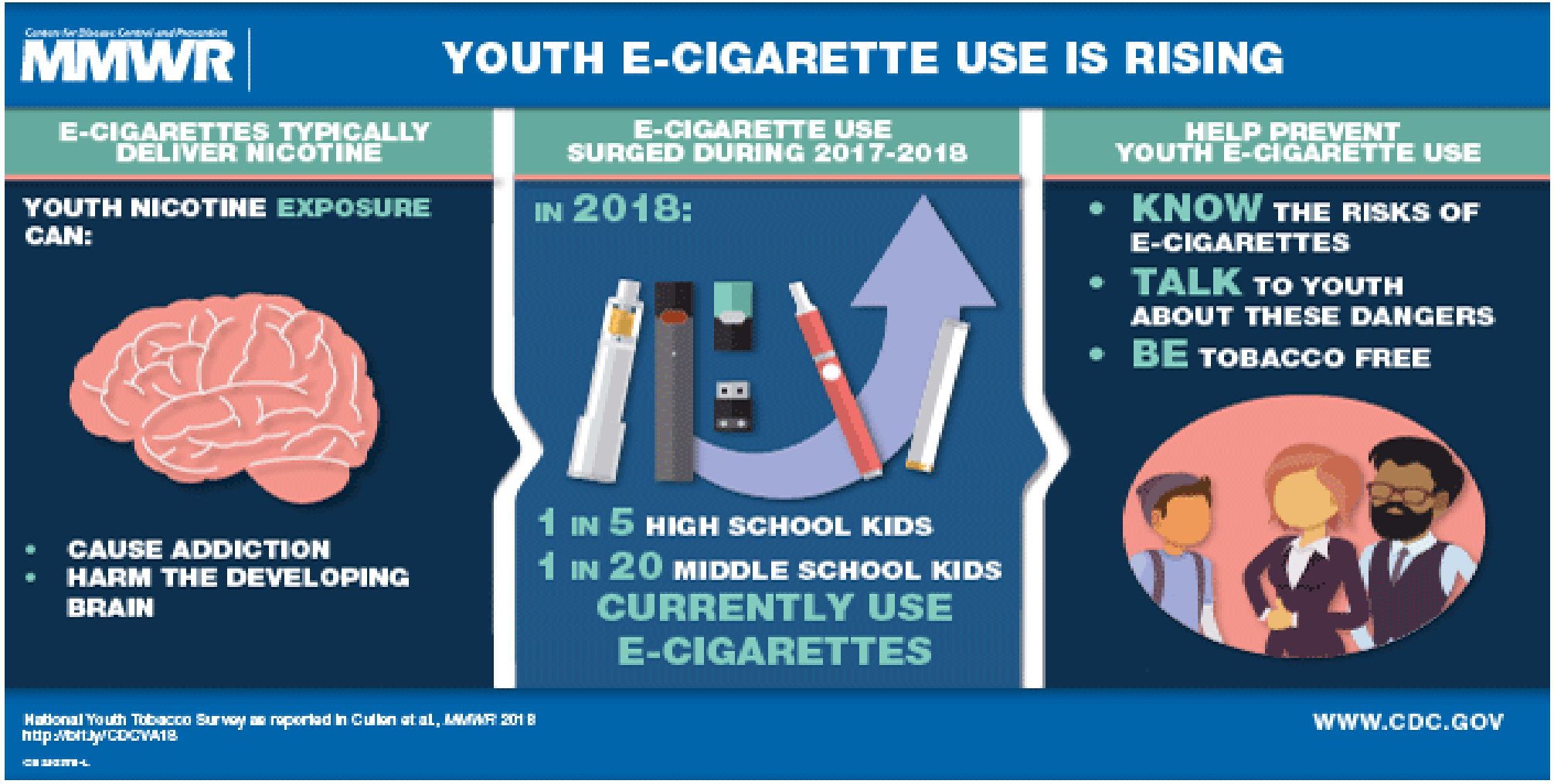
Youth E-cigarette Use: Infographic from CDC's MMWR



Source: Cullen KA, Ambrose BK, Gentzke AS, Apelberg BJ, Jamal A, King BA. *Notes from the Field:* Use of Electronic Cigarettes and Any Tobacco Product Among Middle and High School Students — United States, 2011–2018. MMWR Morb Mortal Wkly Rep 2018;67:1276–1277.

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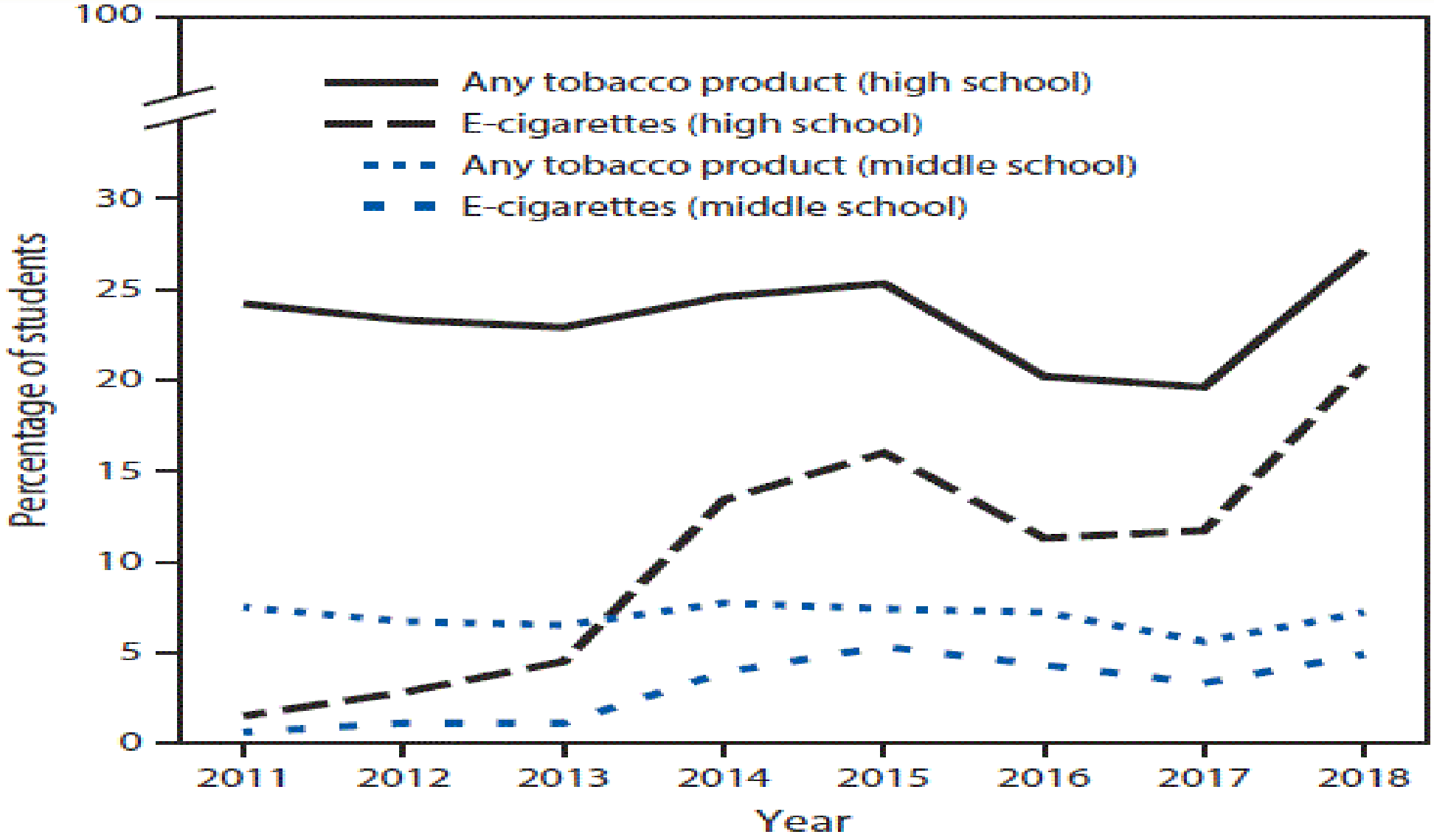
Current Use of E-cigarettes and Any Tobacco Product Among Middle and High School Students— NYTS, US, 2011–2018



Source: Cullen KA, Ambrose BK, Gentzke AS, Apelberg BJ, Jamal A, King BA. *Notes from the Field:* Use of Electronic Cigarettes and Any Tobacco Product Among Middle and High School Students — United States, 2011–2018. MMWR Morb Mortal Wkly Rep 2018;67:1276–1277.

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Adverse Health Effects of Nicotine

- Nicotine exposure during adolescence can result in addiction.
- Nicotine can harm the developing adolescent brain.
- Nicotine delivered by e-cigarettes during pregnancy can result in multiple adverse consequences, including sudden infant death syndrome, and could result in altered corpus callosum, deficits in auditory processing, and obesity.
- Ingestion of e-cigarette liquids containing nicotine can cause acute toxicity and possibly death if the contents of refill cartridges or bottles containing nicotine are consumed.

Source: U.S. Department of Health and Human Services. E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.

E-cigarette Adverse Health Effects

- E-cigarettes expose users to several chemicals, in addition to nicotine: heavy metals (chromium, lead, manganese, nickel and zinc), arsenic, volatile organic compounds (propylene glycol or glycerol), all known to have adverse health effects.
- The health effects and potentially harmful effects of doses of heated and aerosolized constituents of e-cigarette liquids, including solvents, flavorants, and toxicants, are not completely understood.
- E-cigarettes can also be used to deliver other drugs, including marijuana. In 2016, one-third of U.S. middle and high school students who ever used e-cigarettes had used marijuana in e-cigarettes.

Sources (Bullets 1-2): U.S. Department of Health and Human Services. E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.
Bullet 3: Trivers KF, Phillips E, Gentzke AS, Tynan MA, Neff LJ. Prevalence of Cannabis Use in Electronic Cigarettes Among US Youth. JAMA pediatrics. 2018;172(11):1097-1099.

SAMHSA Actions in coming year

- **Marijuana:**
- Continue NSDUH and DAWN data collection related to marijuana
- Provide education/training materials oriented to providers and to the public related to marijuana risks
- Specific materials aimed at special populations e.g.: pregnant women, youth
- Assist in identification of hazardous use and use disorders with SBIRT
- Fund prevention, treatment and recovery services in states/communities
- **Kratom**
- Education for healthcare providers and the public on kratom properties/adverse effects
- PSAs
- **E-cigarettes/vaping**
- Add NSDUH questions to better understand epidemiology
- Education for healthcare professionals and public, PSAs
- ***Continue to speak out on known risks and accumulating evidence for adverse effects of marijuana, kratom, and e-cigarettes/nicotine***

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Thank you!

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Kratom:

Cinosi E.; Martinotti; et al. Following “the Roots” of Kratom (Mitragyna speciosa): The Evolution of an Enhancer from a Traditional Use to Increase Work and Productivity in Southeast Asia to a Recreational Psychoactive Drug in Western Countries; Biomed Res Int. 2015; 2015: 968786.

https://www.fda.gov/NewsEvents/PublicHealthFocus/ucm584952.htm

The Surgeon General's Warning on Marijuana

The Surgeon General of the Public Health Service has issued the following warning on marijuana:

Marijuana use is a major public health problem in the United States. In the past 20 years, its' use has increased 30-fold; it estimated that more than a quarter of the American population has used it. The age at which persons first use marijuana has decreased gradually to the junior high school years. Until recently, nearly 11% of high school seniors used it, and although that figure has declined to 7%, its daily use still exceeds that of alcohol; more high school seniors use marijuana than smoke cigarettes. In a recent study, 32% of those surveyed had used marijuana during the previous 30 days, while 25% had smoked tobacco.

On March 24, 1982, the Department of Health and Human Services submitted to Congress a report reviewing the consequences of marijuana use. Marijuana and Health, 1982, ninth in a series, is primarily based on two recently conducted, comprehensive, scientific reviews by the Institute of Medicine of the National Academy of Sciences, the Canadian Addiction Research Foundation, and the World Health Organization (WHO).

Both independent reviews corroborate the Public Health Service's findings of health hazards associated with marijuana use: Acute intoxication with marijuana interferes with many aspects of mental functioning and has serious, acute effects on perception and skilled performance, such as driving and other complex tasks involving judgement or fine motor skills.

Among the known or suspected chronic effects of marijuana are:

short-term memory impairment and slowness of learning.

impaired lung function similar to that found in cigarette smokers. Indications are that more serious effects, such as cancer and other lung disease, follow extended use.

decreased sperm count and sperm motility.

interference with ovulation and pre-natal development.

impaired immune response.

possible adverse effects on heart function.

by-products of marijuana remaining in body fat for several weeks, with unknown consequences. The storage of these by-products increases the possiblilties for chronic, as well as residual, effects on performance, even after the acute reaction to the drug has worn off. Of special concern are the long-term developmental effects in children and adolescents, who are particularly vulnerable to the drug's behavioral and psychological effects. The "amotivational syndrome," characterized by a pattern of energy loss, diminished school performance, harmed parental relationships, and other behavorial disruptions, has been associated with prolonged marijuana use by young persons. Although more research is required, recent national surveys report that 40% of heavy users experience some or all of those symptom

The Public Health Service concludes that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health, and it supports the major conclusion of the National Academy of Sciences' Institute of Medicine.