Epidemiology and Health Effects of Marijuana

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Clark County Council work session, April 3,2019
Public Service Center, 1300 Franklin St, 6th floor at 10:30 a.m.

Overview

- Marijuana Epidemiology

  - Youth and adult use before and after legalization

- What's known about marijuana health effects

  - Hospitalization, ER visits and poison center calls

Epidemiology – youth use

- ## Healthy Youth Survey (HYS)

  - Biennial survey among 6th, 8th, 10th and 12th graders across Washington State

  - Questions include drug and alcohol use and other health related risk factors

  - Questions have been asked throughout the U.S. for over 25 years and have been extensively tested for reliability and validity

HYS Reliability and Validity

HYS survey questions have been asked throughout the U.S. for over 25 years and have been extensively tested for **reliability and validity**.

Reliability: Survey questions are reliable if they consistently produce the same results under the same circumstances.

Validity: Survey questions are valid if they accurately measure what they were intended to measure.

HYS: Reliability

Survey questions are reliable if they consistently produce the same results under the same circumstances.

HYS is **reliable** because:

- Anonymous survey, in a safe confidential environment

- Standardized administration procedures

- Informing students about the importance of survey

- HYS uses clear, concise wording in questions, which students are less likely to misinterpret.

Validity

Survey questions are valid if they accurately measure what they were intended to measure.

<u>HYS is **valid** because:</u>

- Questions are kept as consistent as possible over time

- Questions used from established national youth surveys

- New untested questions are piloted with youth

- The data is "cleaned" (quality control checks)

  - Fake drug "loziderb"

  - Too many missing responses

  - Inconsistent answers

  - Dishonesty

  - Wrong grade

Only 4% of surveys are discarded during data cleaning

Participation

- **70% or greater participation** – Results are probably representative of students in this grade
- **40-69% participation** – Results may be representative of students in this grade
- **Less than 40% participation** – Results are likely not representative of students in the grade, but do reflect students who complete the survey

Clark County Participation Rates for 2016 Healthy Youth Survey				
	Grade 6	**Grade 8**	**Grade 10**	**Grade 12**
Number of students surveyed	2,985	3,014	4,534	3,389
Number of valid responses	2,942	2,927	4,354	3,236
Number of enrolled students	3,654	3,610	6,114	6,225
Your survey participation rate	**81%**	**81%**	**71%**	**52%**

HYS Partners

Percent of 10th graders who used marijauna at least once in their life, 2004-2018
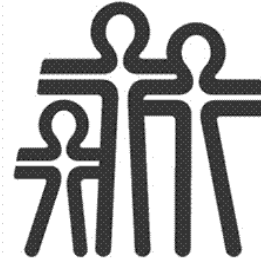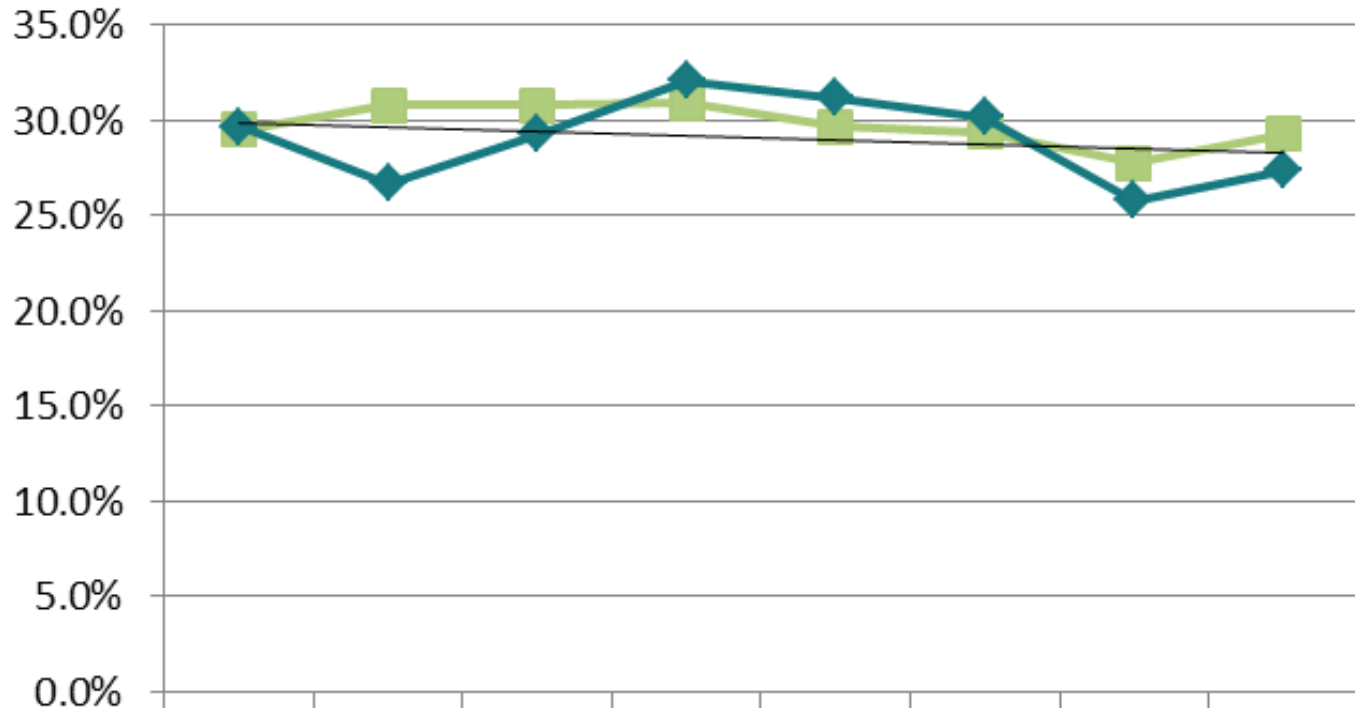
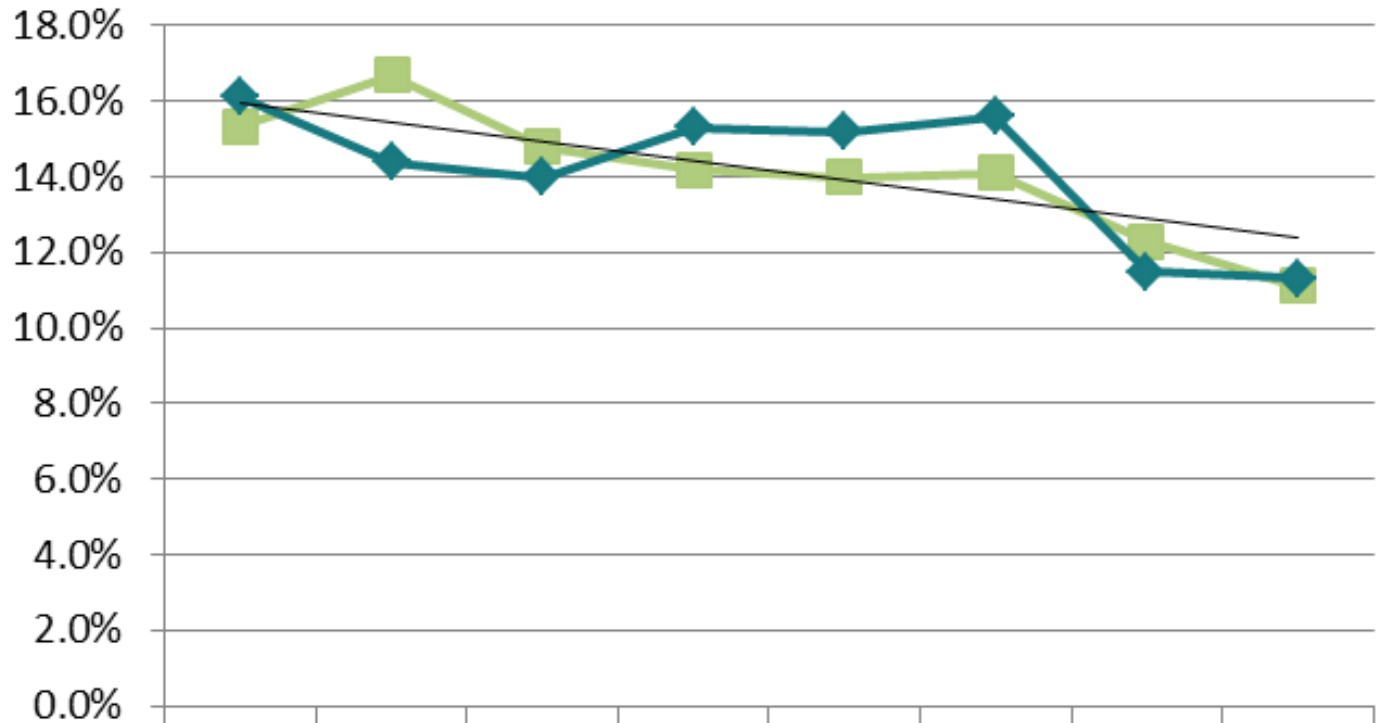|	2004	2006	2008	2010	2012	2014	2016	2018
WA State	29.5%	30.8%	30.8%	30.9%	29.7%	29.4%	27.8%	29.3%
Clark	29.7%	26.7%	29.3%	32.1%	31.2%	30.2%	25.8%	27.4%

Percent of 10th graders who used marijuana at least once in the past 30 days, 2004-2018
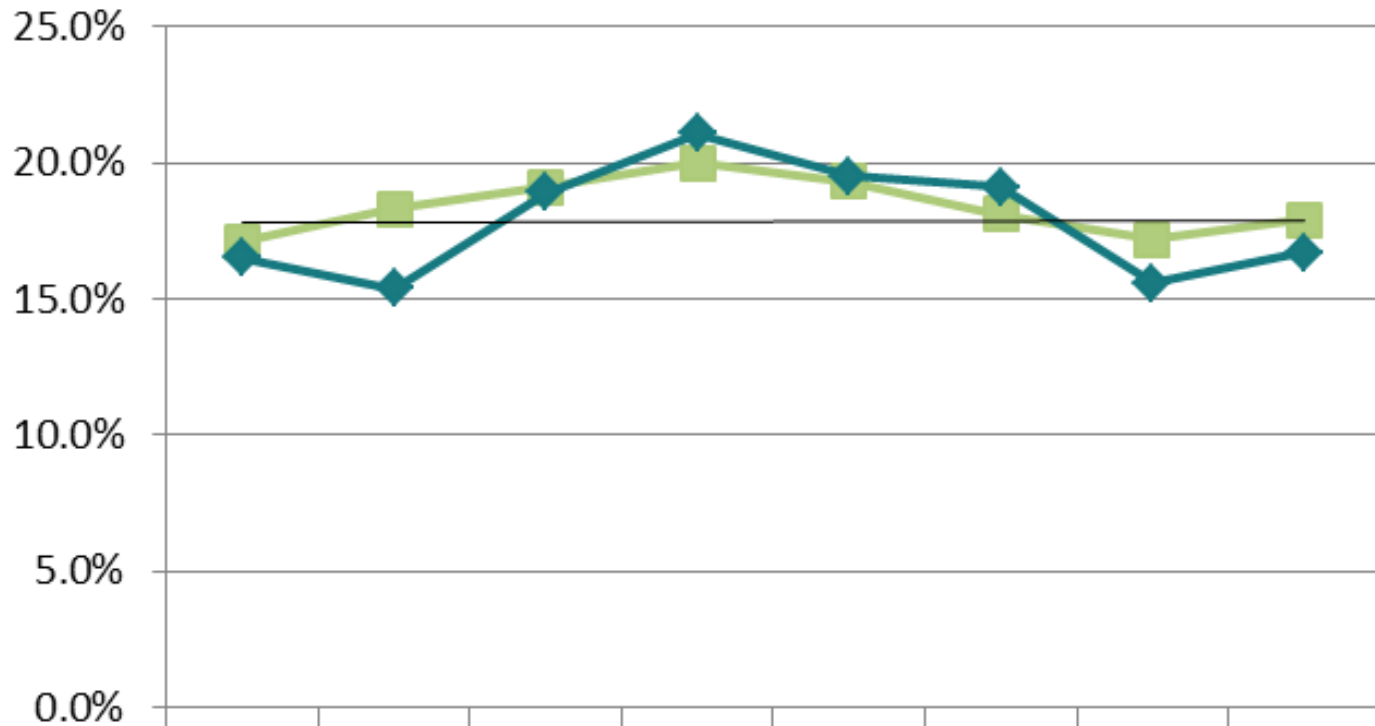
	2004	2006	2008	2010	2012	2014	2016	2018
WA State	17.1%	18.3%	19.1%	20.0%	19.3%	18.1%	17.2%	17.9%
Clark	16.5%	15.4%	18.9%	21.1%	19.5%	19.1%	15.6%	16.7%

Percent of 10th graders who started using marijuana at age 13 or younger, 2004-2018

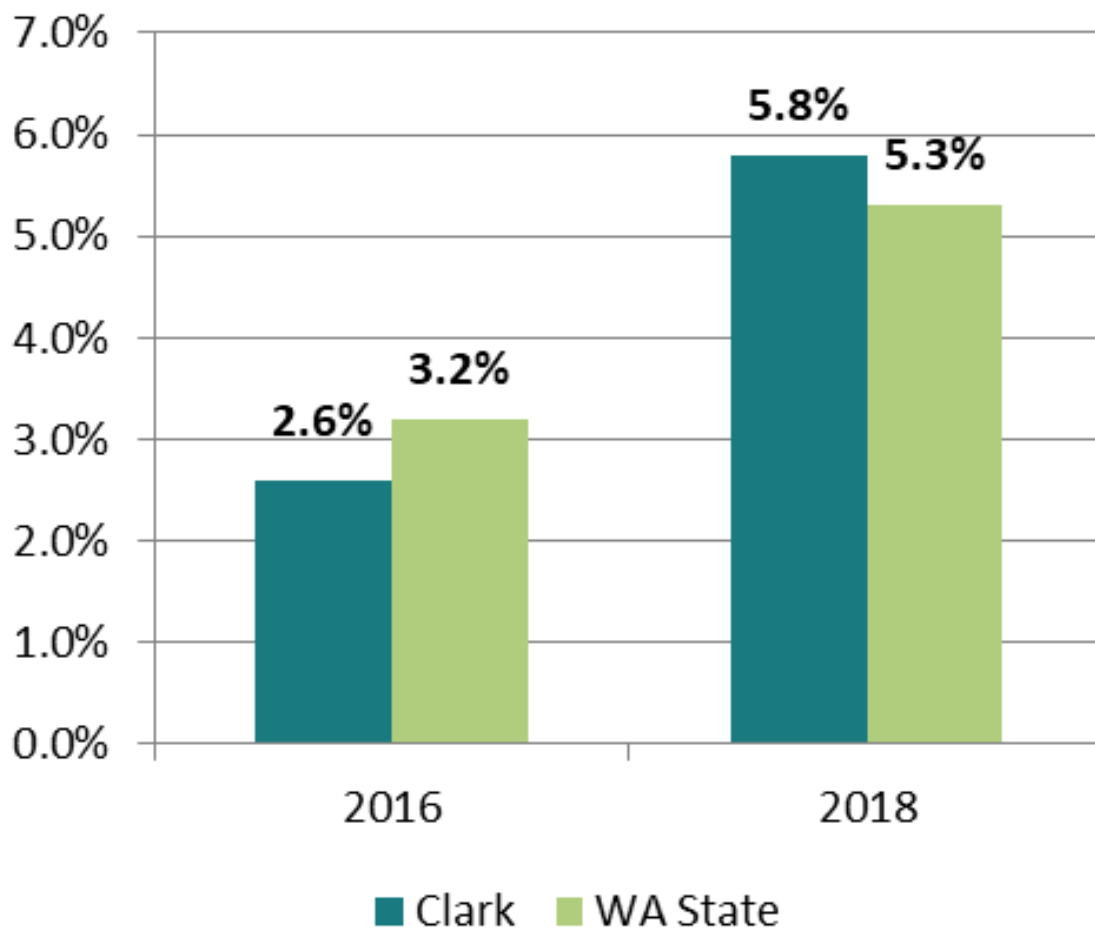|	2004	2006	2008	2010	2012	2014	2016	2018
WA State	15.4%	16.7%	14.8%	14.2%	14.0%	14.1%	12.3%	11.1%
Clark	16.1%	14.4%	14.0%	15.3%	15.2%	15.6%	11.5%	11.3%

Percent of 10th graders who perceive no or low risk of harm from regular marijuana use, 2004-2018
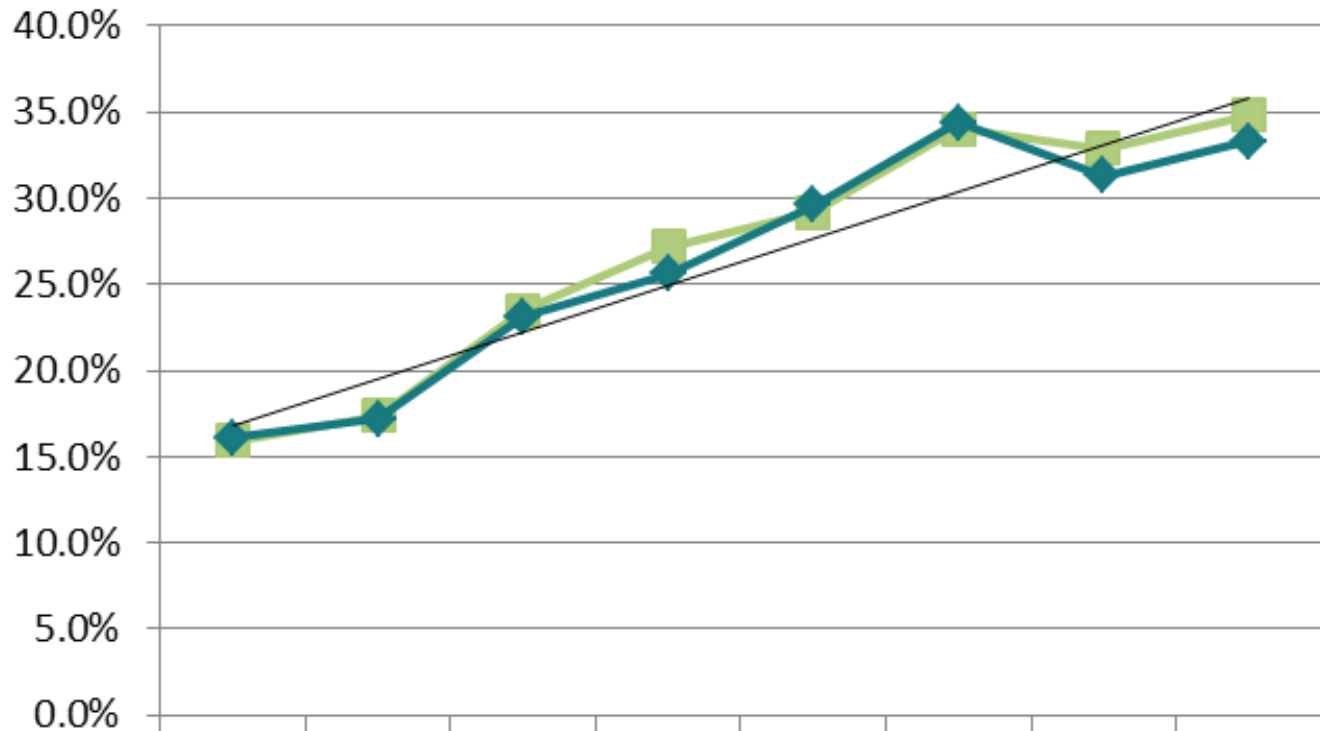
	2004	2006	2008	2010	2012	2014	2016	2018
WA State	15.9%	17.4%	23.5%	27.2%	29.2%	34.0%	32.9%	34.8%
Clark	16.1%	17.2%	23.1%	25.6%	29.6%	34.4%	31.3%	33.3%

Percent of 10th graders who vaped marijuana in the past 30 days

During the past 30 days, how did you get marijuana? Choose all that apply

I got it in some other way — 2.4%
I stole it from a store — 1.0%
I got it from an older brother or sister — 1.1%
I got it at a party — 2.1%
I got it at home with my parent's permission — 1.1%
I took it from home without permission — 1.3%
Gave money to someone to get it for me — 3.2%
Got it from friends — 10.4%
Bought it from a store — 1.0%
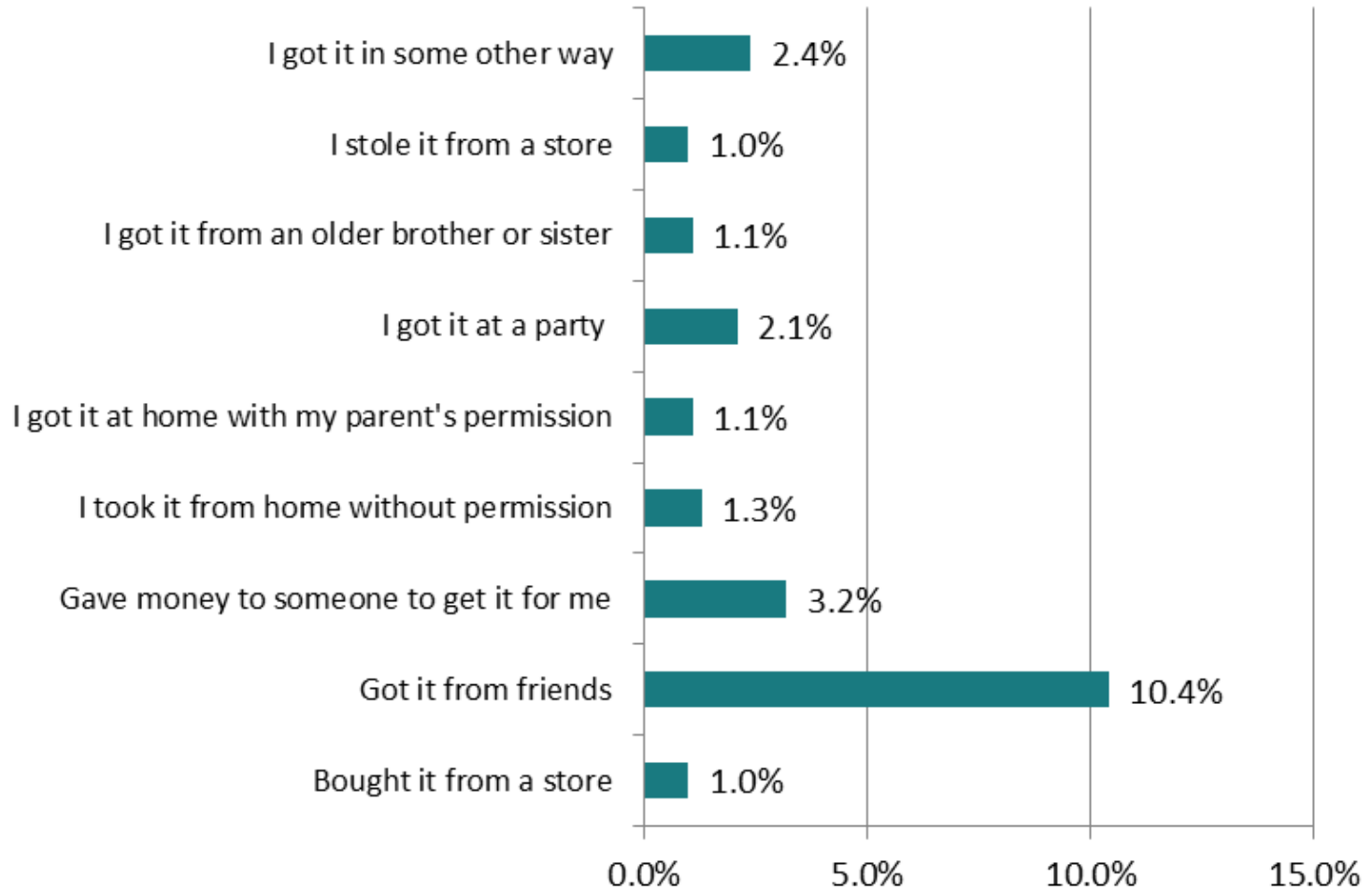
Percent of 10th graders who report easy access to marijuana, 2004-2018
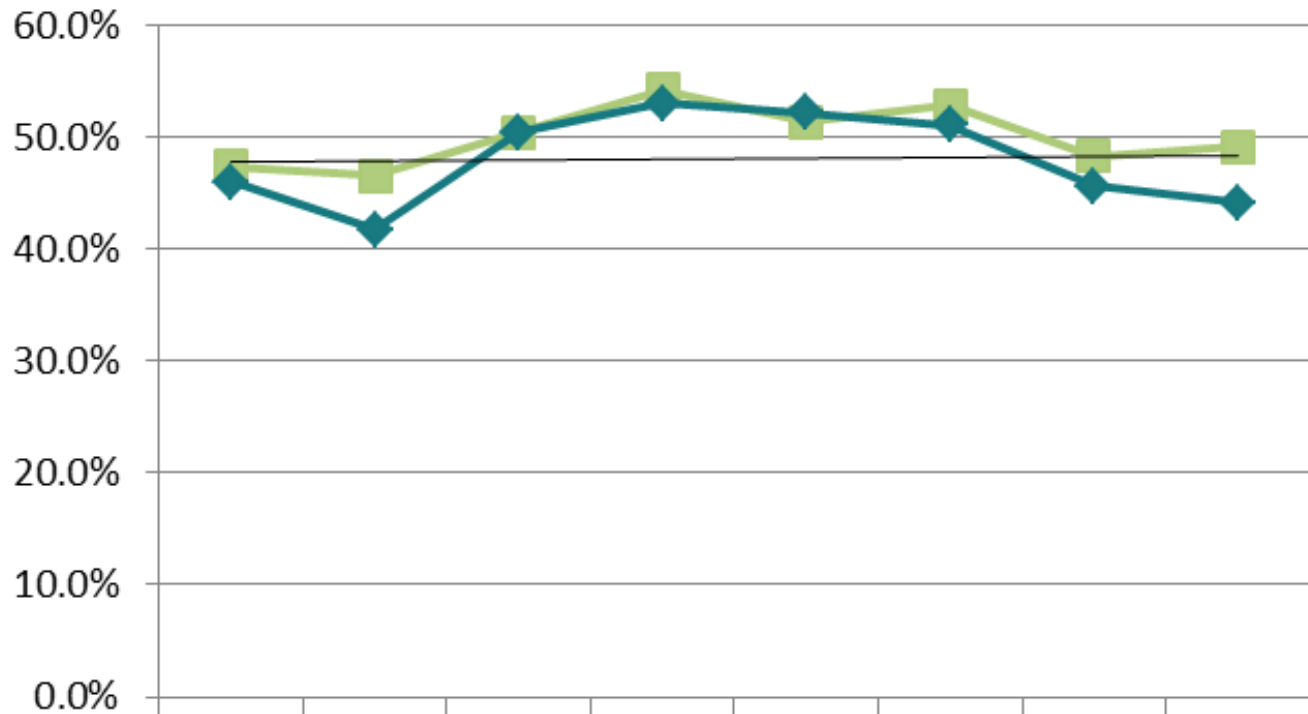
|	2004	2006	2008	2010	2012	2014	2016	2018
WA State	47.4%	46.6%	50.5%	54.3%	51.4%	52.9%	48.4%	49.2%
Clark	46.1%	41.8%	50.5%	53.1%	52.3%	51.1%	45.7%	44.2%

Percent of 10th graders who live with someone who uses marijuana
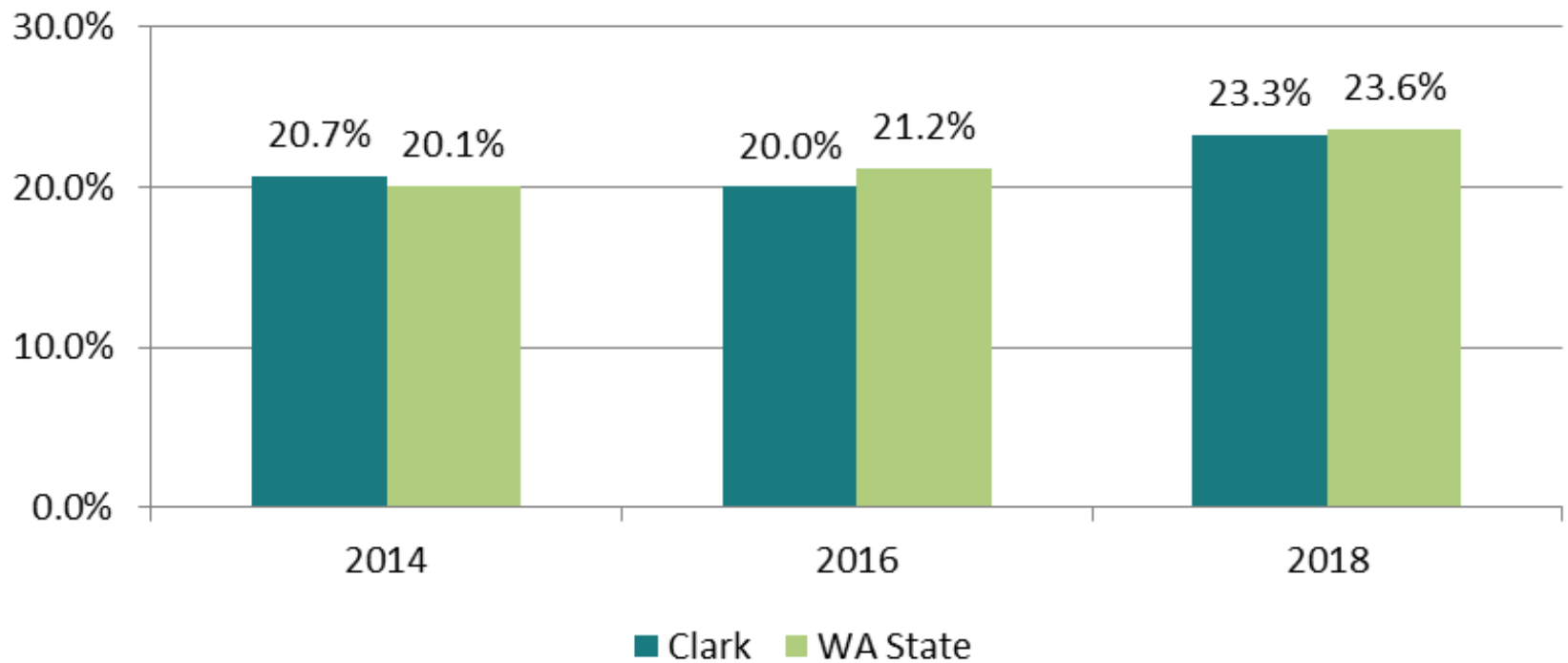
Percent of 10th graders whose parents have not discussed reasons to not use marijuana with them
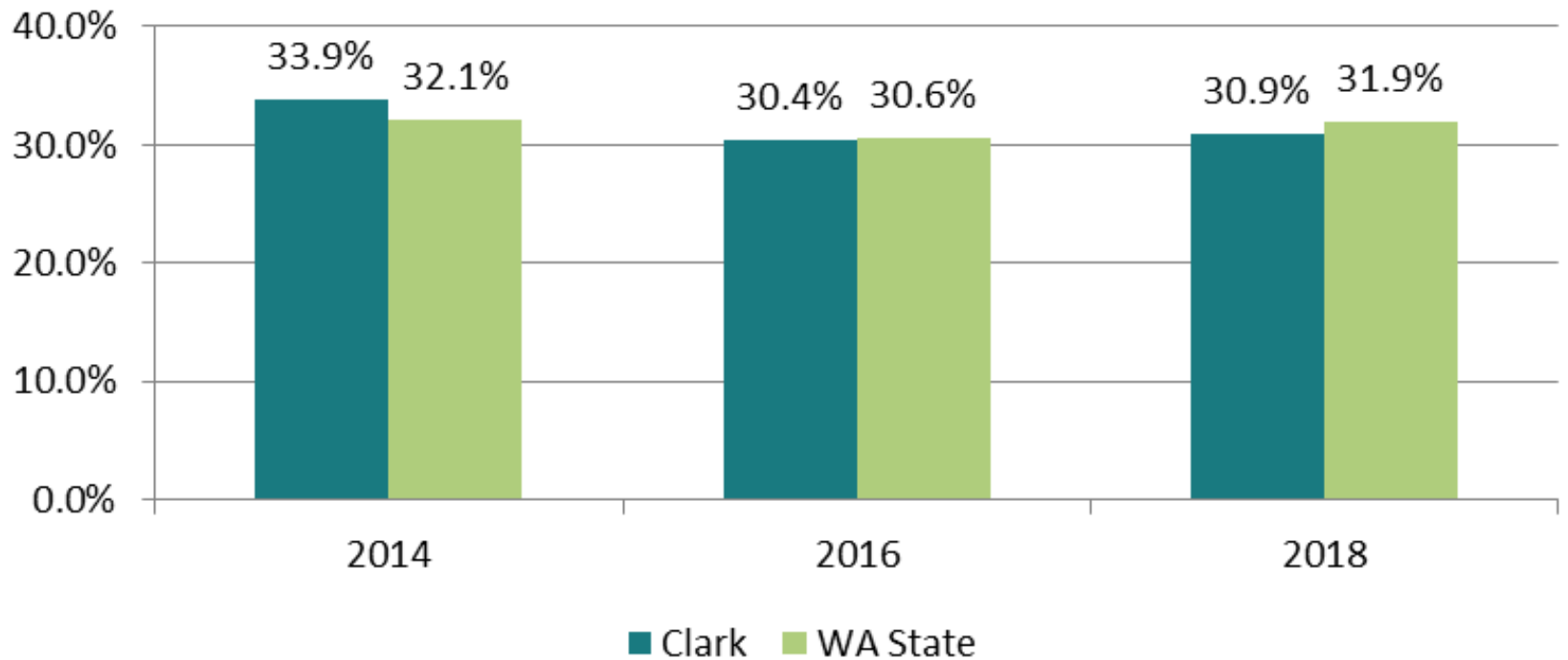
Percent of 10th graders who drove a car or other vehicle within three hours after using marijuana in the past 30 days
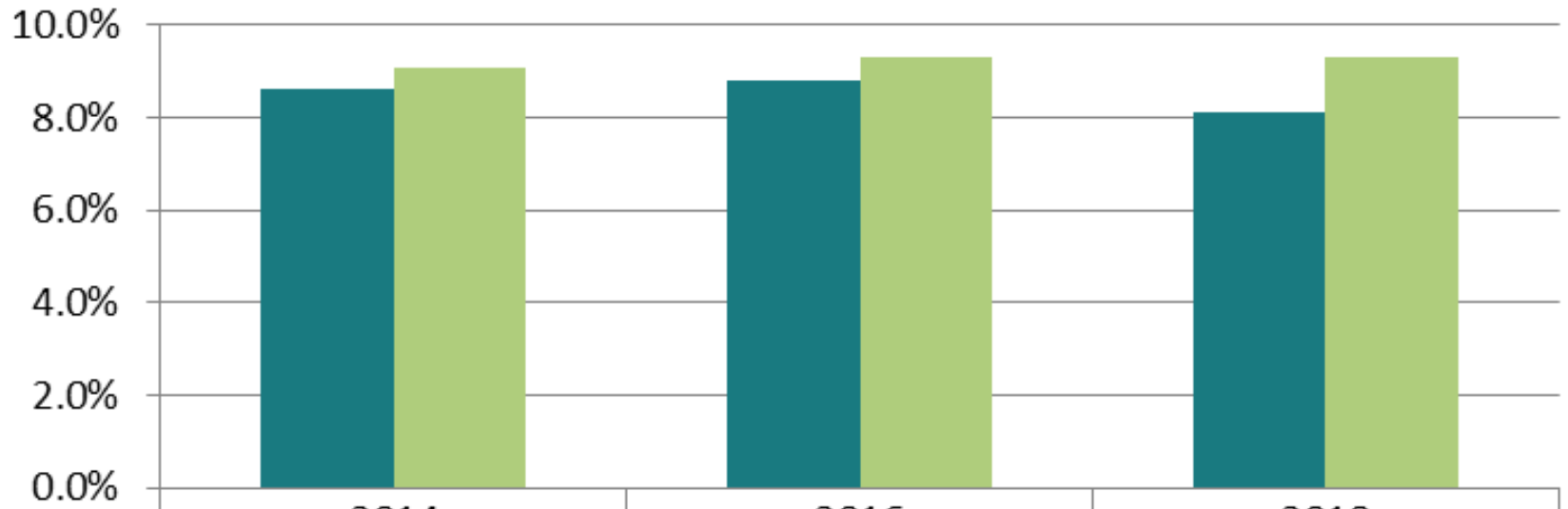
	2014	2016	2018
■ Clark	8.6%	8.8%	8.1%
■ WA State	9.1%	9.3%	9.3%

Percent of 10th graders who rode in a car or other vehicle in the past 30 days driven by someone who had been using marijuana
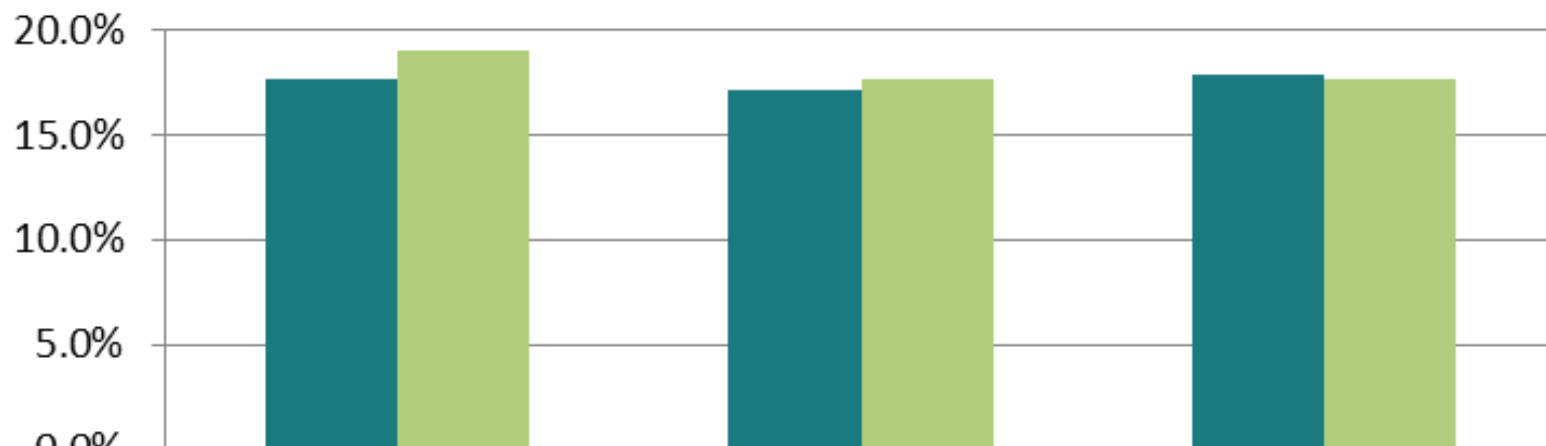
	2014	2016	2018
Clark	17.6%	17.1%	17.9%
WA State	19.0%	17.6%	17.6%

Past Month Marijuana Use Among Adolescents Aged 12–17 in Washington and the United States (Annual Averages, 2011–2012 to 2014–2015)[1]

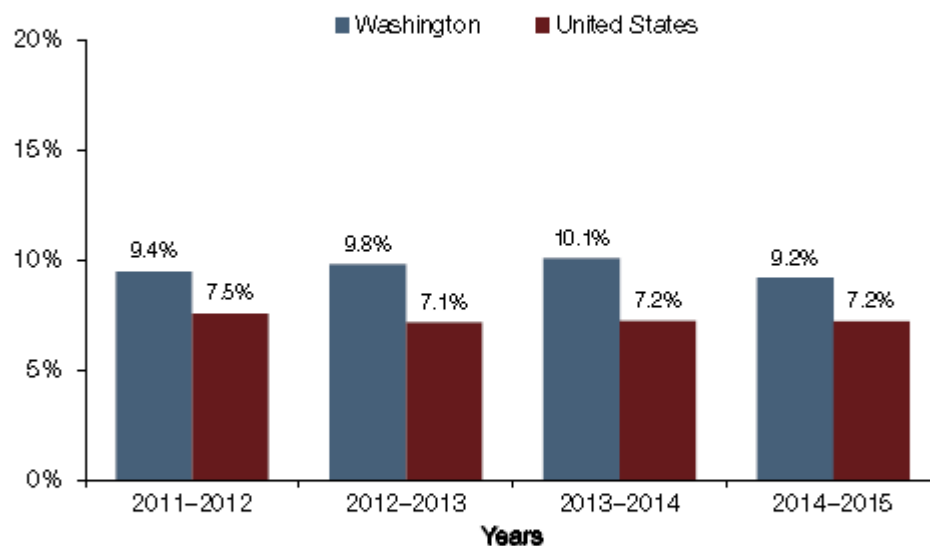In 2014–2015, Washington's annual average percentage of marijuana use among adolescents aged 12–17 was higher than the corresponding national annual average percentage.

■ Washington   ■ United States

Years	Washington	United States
2011–2012	9.4%	7.5%
2012–2013	9.8%	7.1%
2013–2014	10.1%	7.2%
2014–2015	9.2%	7.2%

Years

9.2% In Washington, an annual average of about 49,000 adolescents aged 12–17 (9.2% of all adolescents) in 2014–2015 used marijuana in the past month. The annual average percentage in 2014–2015 was not significantly different from the annual average percentage in 2011–2012.

Past 30 day marijuana use among Oregon 11th graders

	2009	2011	2013	2015	2017
Oregon	21.8%	20.6%	20.9%	19.1%	20.9%
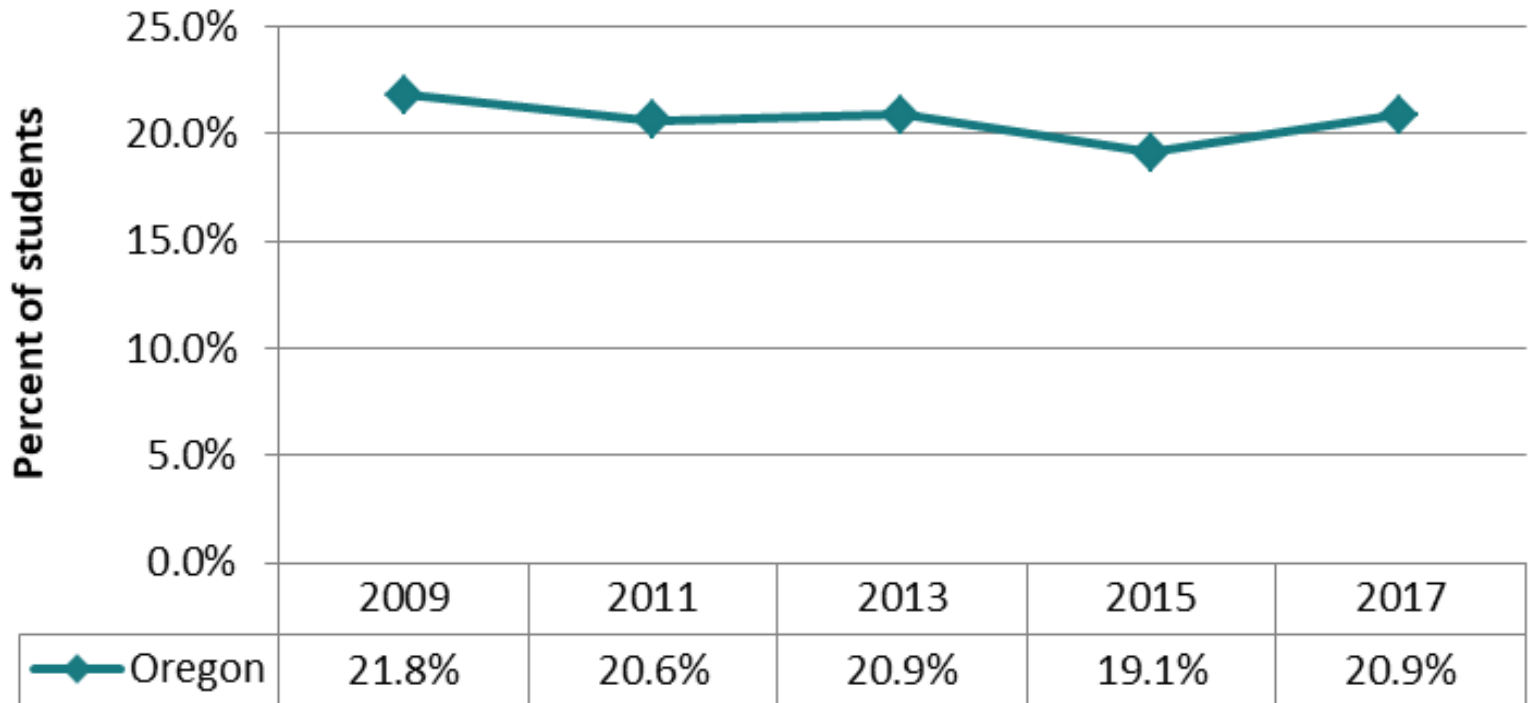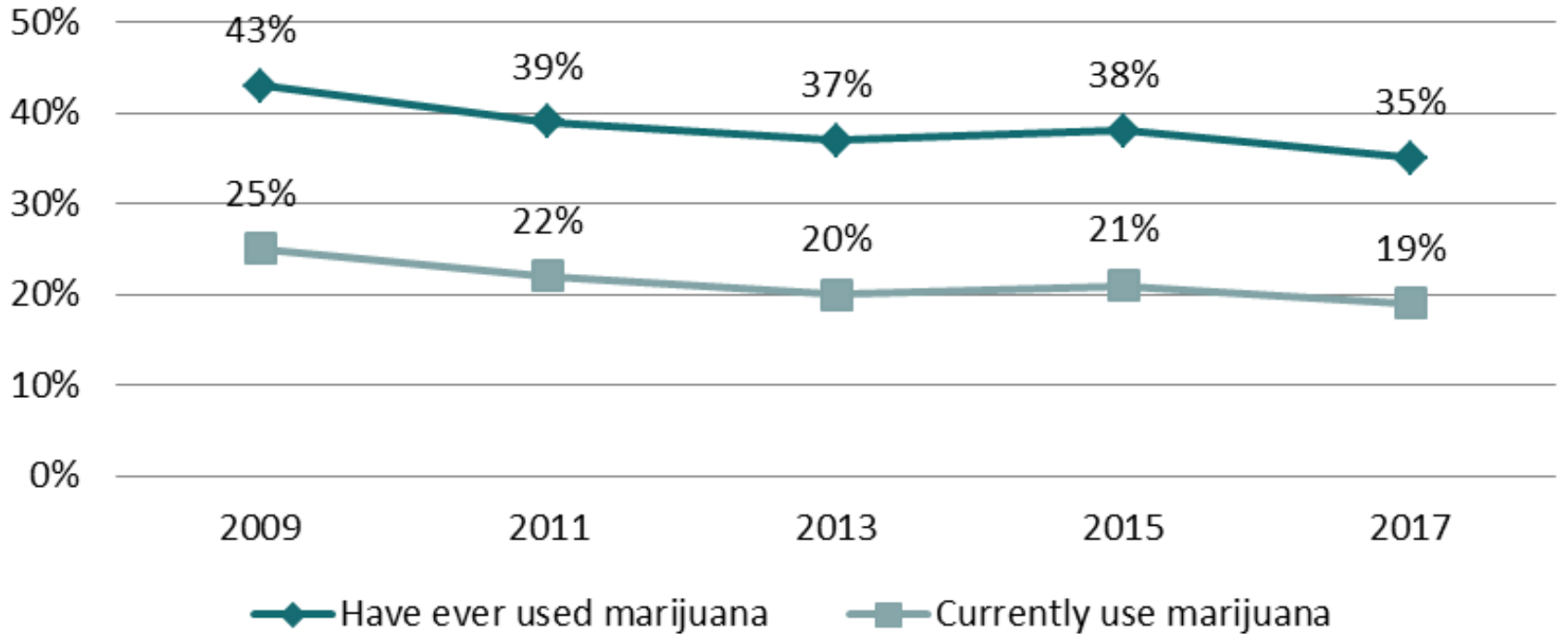
Data Source: Healthy Kids Colorado Survey, 2009-2017
(Colorado 9th-12th graders)

Clark County Youth Substance Use, 10th graders, 2018

Substance	Percent
Heroin	2%
Methampetamines	3%
Cocaine	4%
Cigarettes	19%
Marijuana	27%
E-cigarettes	35%
Alcohol	46%

Percent of Youth who have tried these substances at least once in their lives
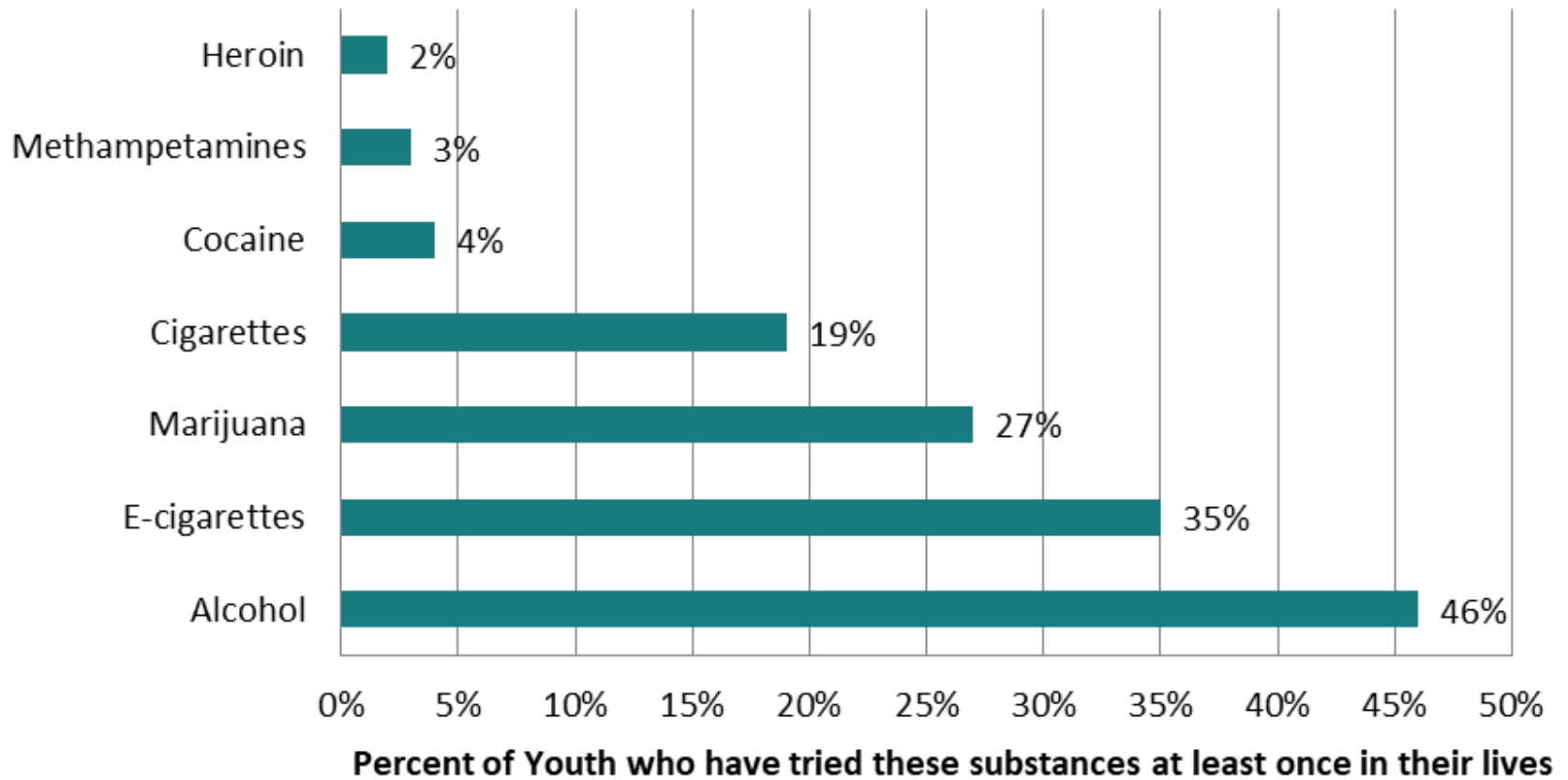
Data Source: Washington Healthy Youth Survey, 2018 (Clark County 10th graders)
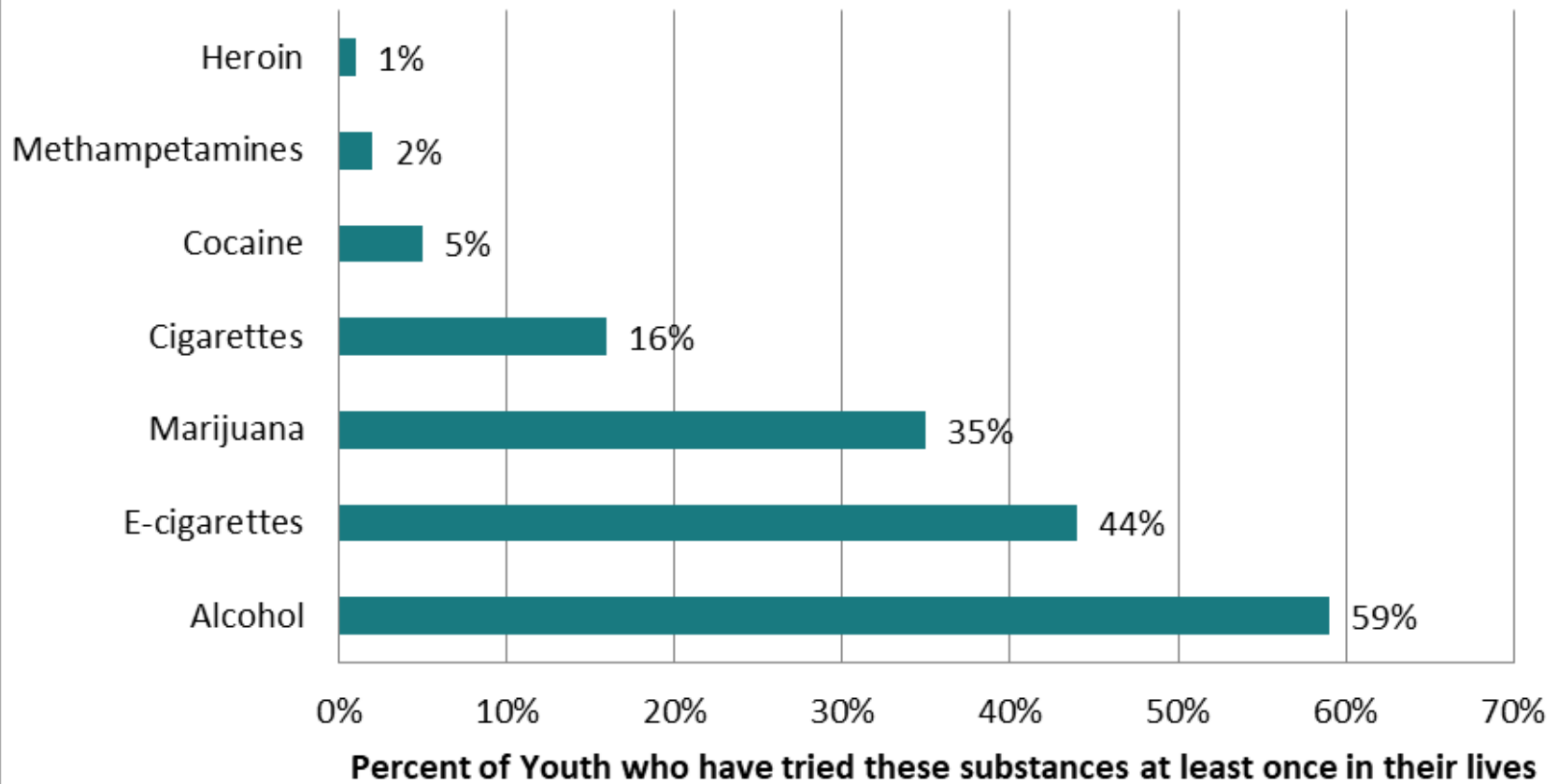
Data Source: Healthy Kids Colorado Survey, 2017 (Colorado 9th-12th graders)

Epidemiology – adult use

- Behavioral Risk Factor Surveillance System (BRFSS):

  - Yearly telephone survey conducted by the Washington State Department of Health in partnership with the Center for Disease Control and Prevention (CDC).
  - Measures changes in the health and health behaviors, such as substance use, physical activity and diet
  - Washington State residents 18 years of age and older are randomly selected to participate in the survey.
  - The reliability and validity of BRFSS survey questions have been continuously tested since BRFSS began in 1984.

BFRSS- reliability and validity

- Questions are tested among potential respondents before use
- Multiple survey questions ask the same question but in a different way, and if answers do not match up, the survey is thrown out.
- Survey participation is completely confidential.
- Survey results are continuously compared to results from other national surveys.
- Multiple scientific studies have tested respondent's answers to their medical records and physical measurements and found a high correlation between the two.
- Questions are kept as consistent as possible over time. Although under reporting may occur, it is consistent over time, which allows us to accurately look at trends.

Percent of adults reporting any marijuana use in past 30 days Clark County & WA State, 2011-2017

	2011	2012	2013	2014	2015	2016	2017
WA	8.3	8	9.6	10.7	12.8	14.6	16.6
Clark	6.9	6.6	9.6	13.00	12.80	12.4	16.1
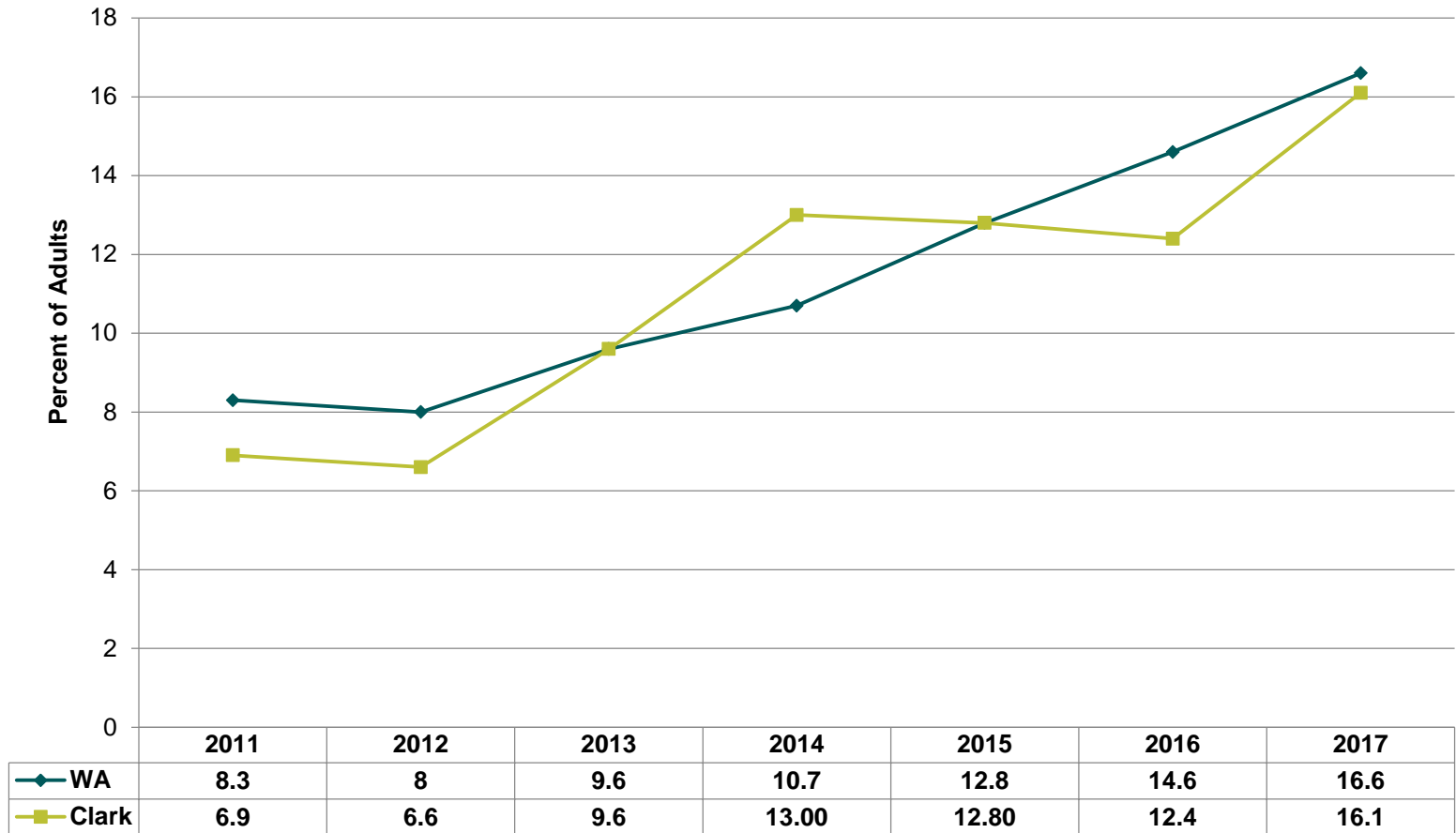
Marijuana Health Effects

- National Academies of Sciences, Engineering, and Medicine 2017

- The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research. Washington, DC: The National Academies Press

- Therapeutic and Adverse Health Effects

Levels of Evidence on Association between Cannabis and Health

- Conclusive
  - Many supportive findings from good-quality studies with no credible opposing findings. A firm conclusion can be made, and the limitations to the evidence, including chance, bias, and confounding factors, can be ruled out with reasonable confidence.
- Substantial
  - There are several supportive findings from goodquality studies with very few or no credible opposing findings. A **firm** conclusion can be made, but minor limitations, including chance, bias, and confounding factors, cannot be ruled out with reasonable confidence.
- Moderate
  - There are several supportive findings from good- to fair-quality studies with very few or no credible opposing findings. A **gener**al conclusion can be made, but limitations, including chance, bias, and confounding factors, cannot be ruled out with reasonable confidence.

Levels of Evidence on Association between Cannabis and Health

- **Limited**
  - There are supportive findings from fair-quality studies or mixed findings with most favoring one conclusion. A conclusion can be made, but there is significant uncertainty due to chance, bias, and confounding factors.
- **No or Insufficient:**
  - There are mixed findings, a single poor study, or health endpoint has not been studied at all. No conclusion can be made because of substantial uncertainty due to chance, bias, and confounding factors.

Therapeutic Health Effects - Highlights

- There is conclusive or substantial evidence that cannabis or cannabinoids are effective:
  - For the treatment of chronic pain in adults
  - As anti-emetics in the treatment of chemotherapy-induced nausea and vomiting
  - For improving patient-reported multiple sclerosis spasticity symptoms
- There is moderate evidence that cannabis or cannabinoids are effective for:
  - Improving short-term sleep outcomes in individuals with sleep disturbance associated with obstructive sleep apnea syndrome, fibromyalgia, chronic pain, and multiple sclerosis

Therapeutic Health Effects - Highlights

- There is limited evidence that cannabis or cannabinoids are effective for:
  - Increasing appetite and decreasing weight loss associated with HIV/AIDS
  - Improving clinician-measured multiple sclerosis spasticity symptoms
  - Improving symptoms of Tourette syndrome
  - Improving anxiety symptoms, as assessed by a public speaking test, in individuals with social anxiety disorders
  - Improving symptoms of posttraumatic stress disorder
- There is limited evidence of a statistical association between cannabinoids and:
  - Better outcomes (i.e., mortality, disability) after a traumatic brain injury or intracranial hemorrhage

Therapeutic Health Effects - Highlights

- There is limited evidence that cannabis or cannabinoids are *ineffective* for:
    - Improving symptoms associated with dementia
    - Improving intraocular pressure associated with glaucoma (cannabinoids)
    - Reducing depressive symptoms in individuals with chronic pain or multiple sclerosis

Therapeutic Health Effects - Highlights

- There is no or insufficient evidence to support or refute the conclusion that cannabis or cannabinoids are an effective treatment for:
  - Cancers, including glioma
  - Cancer-associated anorexia cachexia syndrome and anorexia nervosa
  - Symptoms of irritable bowel syndrome
  - Epilepsy
  - Spasticity in patients with paralysis due to spinal cord injury
  - Symptoms associated with amyotrophic lateral sclerosis
  - Chorea and certain neuropsychiatric symptoms associated with Huntington's disease
  - Motor system symptoms associated with Parkinson's disease
  - Dystonia
  - Achieving abstinence in the use of addictive substances
  - Mental health outcomes in individuals with schizophrenia

Therapeutic Effects, Bottom Line:

- In adults with chemotherapy-induced nausea and vomiting, oral cannabinoids are effective anti-emetics.

- In adults with chronic pain, patients who were treated with cannabis or cannabinoids are more likely to experience a clinically significant reduction in pain symptoms.

- In adults with multiple sclerosis (MS)-related spasticity, short term use of oral cannabinoids improves patient-reported spasticity symptoms.

- For these conditions the effects of cannabinoids are modest; for all other conditions evaluated there is inadequate information to assess their effects.

Adverse Effects: Cancer

- Moderate evidence of *no* statistical association between cannabis use and:
  - Incidence of lung cancer (smoking)
  - Incidence of head and neck cancers
- Limited evidence of a statistical association between cannabis smoking and:
  - Non-seminoma-type testicular germ cell tumors (current, frequent, or chronic cannabis smoking)
- No or insufficient evidence to support or refute a statistical association between cannabis use and:
  - Incidence of esophageal cancer (cannabis smoking)
  - Incidence of prostate cancer, cervical cancer, malignant gliomas, non-Hodgkin lymphoma, penile cancer, anal cancer, Kaposi's sarcoma, or bladder cancer
  - Subsequent risk of developing acute myeloid leukemia/acute non-lymphoblastic leukemia, acute lymphoblastic leukemia, rhabdomyosarcoma, astrocytoma, or neuroblastoma in offspring (parental cannabis use)

Cancer, Bottom Line

- The evidence suggests that smoking cannabis does not increase the risk for certain cancers (i.e., lung, head and neck) in adults.

- There is modest evidence that cannabis use is associated with one subtype of testicular cancer.

- There is minimal evidence that parental cannabis use during pregnancy is associated with greater cancer risk in offspring.

Adverse Effects: Heart Disease

- **There is limited evidence of a statistical association between cannabis use and:**

  - The triggering of acute myocardial infarction (cannabis smoking) (

  - Ischemic stroke or subarachnoid hemorrhage

  - Decreased risk of metabolic syndrome and diabetes

  - Increased risk of prediabetes

- **There is no evidence to support or refute a statistical association between *chronic effects* of cannabis use and:**

  - The increased risk of acute myocardial infarction

Heart Disease, Bottom Line

- The evidence is unclear as to whether and how cannabis use is associated with heart attack, stroke, and diabetes.

Adverse Effects: Respiratory Disease

- Substantial evidence of a statistical association between cannabis smoking and:
  - Worse respiratory symptoms and more frequent chronic bronchitis episodes (long-term smoking)
- Moderate evidence of a statistical association between cannabis smoking and:
  - Improved airway dynamics with acute use
- Moderate evidence of a statistical association between *the cessation* of cannabis smoking and:
  - Improvements in respiratory symptoms

Adverse Effects: Respiratory Disease

- Limited evidence of a statistical association between cannabis smoking and:
  - An increased risk of developing chronic obstructive pulmonary disease (COPD) when controlled for tobacco use (occasional cannabis smoking)
- No or insufficient evidence to support or refute a statistical association between cannabis smoking and:
  - Hospital admissions for COPD
  - Asthma development or asthma exacerbation

Respiratory Disease: Bottom Line

- Smoking cannabis on a regular basis is associated with chronic cough and phlegm production.

- Quitting cannabis smoking is likely to reduce chronic cough and phlegm production.

- It is unclear whether cannabis use is associated with chronic obstructive pulmonary disorder, asthma, or worsened lung function.

Adverse Effects: Injury and Death

- Substantial evidence of a statistical association between cannabis use and:
  - Increased risk of motor vehicle crashes
- Moderate evidence of a statistical association between cannabis use and:
  - Increased risk of overdose injuries, including respiratory distress, among pediatric populations in U.S. states where cannabis is legal
- No or insufficient evidence to support or refute a statistical association between cannabis use and:
  - All-cause mortality
  - Occupational accidents or injuries (general, nonmedical cannabis use)
  - Death due to cannabis overdose

Injury and Death: Bottom Line

- Cannabis use prior to driving increases the risk of being involved in a motor vehicle accident.

- In states where cannabis use is legal, there is increased risk of unintentional cannabis overdose injuries among children.

- It is unclear whether and how cannabis use is associated with all-cause mortality or with occupational injury.

Prenatal, Perinatal and Neonatal Exposure

- Substantial evidence of a statistical association between maternal cannabis smoking and:
  - Lower birth weight of the offspring
- Limited evidence of a statistical association between maternal cannabis smoking and:
  - Pregnancy complications for the mother
  - Admission of the infant to the neonatal intensive care unit (NICU)
- Insufficient evidence to support or refute a statistical association between maternal cannabis smoking and:
  - Later outcomes in the offspring (e.g., sudden infant death syndrome, cognition/academic achievement, and later substance use)

Prenatal, Perinatal and Neonatal Exposure: Bottom Line

- Smoking cannabis during pregnancy is linked to lower birth weight in the offspring.

- The relationship between smoking cannabis during pregnancy and other pregnancy and childhood outcomes is unclear.

Adverse Effects: Psychosocial

- Moderate evidence of a statistical association between cannabis use and:
    - The impairment in the cognitive domains of learning, memory, and attention (acute use)
- Limited evidence of a statistical association between cannabis use and:
    - Impaired academic achievement and education outcomes
    - Increased rates of unemployment and/or low income
    - Impaired social functioning or engagement in developmentally appropriate social roles
- Limited evidence of a statistical association between *sustained abstinence from* cannabis use and:
    - Impairments in the cognitive domains of learning, memory, and attention

Psychosocial: Bottom Line

- Recent cannabis use impairs the performance in cognitive domains of learning, memory, and attention. Recent use may be defined as cannabis use within 24 hours of evaluation.

- A limited number of studies suggest that there are impairments in cognitive domains of learning, memory, and attention in individuals who have stopped smoking cannabis.

- Cannabis use during adolescence is related to impairments in subsequent academic achievement and education, employment and income, and social relationships and social roles.

Adverse Effects: Mental Health

- Substantial evidence of a statistical association between cannabis use and:
  - The development of schizophrenia or other psychoses, with the highest risk among the most frequent users
- Moderate evidence of a statistical association between cannabis use and:
  - Better cognitive performance among individuals with psychotic disorders and a history of cannabis use
  - Increased symptoms of mania and hypomania in individuals diagnosed with bipolar disorders (regular cannabis use
  - A small increased risk for the development of depressive disorders
  - Increased incidence of suicidal ideation and suicide attempts with a higher incidence among heavier users
  - Increased incidence of suicide completion
  - Increased incidence of social anxiety disorder (regular cannabis use)

Adverse Effects: Mental Health

Moderate evidence of *no* statistical association between cannabis use and:

- Worsening of negative symptoms of schizophrenia (e.g., blunted affect) among individuals with psychotic disorders

Adverse Effects: Mental Health

- Limited evidence of a statistical association between cannabis use and:
  - An increase in positive symptoms of schizophrenia (e.g., hallucinations) among individuals with psychotic disorders
  - The likelihood of developing bipolar disorder, particularly among regular or daily users
  - The development of any type of anxiety disorder, except social anxiety disorder
  - Increased symptoms of anxiety (near daily cannabis use)
  - Increased severity of posttraumatic stress disorder symptoms among individuals with posttraumatic stress disorder
- No evidence to support or refute a statistical association between cannabis use and:
  - Changes in the course or symptoms of depressive disorders
  - The development of posttraumatic stress disorder

Mental Health: Bottom Line

- Cannabis use is likely to increase the risk of developing schizophrenia and other psychoses; the higher the use, the greater the risk.
- In individuals with schizophrenia and other psychoses, a history of cannabis use may be linked to better performance on learning and memory tasks.
- Cannabis use does not appear to increase the likelihood of developing depression, anxiety, and posttraumatic stress disorder.
- For individuals diagnosed with bipolar disorders, near daily cannabis use may be linked to greater symptoms of bipolar disorder than for nonusers.
- Heavy cannabis users are more likely to report thoughts of suicide than are nonusers.
- Regular cannabis use is likely to increase the risk for developing social anxiety disorder.

Problem Cannabis Use

- Substantial evidence that:
  - Stimulant treatment of attention deficit hyperactivity disorder (ADHD) during adolescence is *not* a risk factor for the development of problem cannabis use
  - Being male and smoking cigarettes are risk factors for the progression of cannabis use to problem cannabis use
  - Initiating cannabis use at an earlier age is a risk factor for the development of problem cannabis use
- Substantial evidence of a statistical association between:
  - Increases in cannabis use frequency and the progression to developing problem cannabis use
  - Being male and the severity of problem cannabis use, but the recurrence of problem cannabis use does not differ between males and females (13-3b)
- Moderate evidence that:
  - Anxiety, personality disorders, and bipolar disorders are *not* risk factors for the development of problem cannabis use
  - Major depressive disorder is a risk factor for the development of problem cannabis use

Problem Cannabis Use, Bottom Line

- Greater frequency of cannabis use increases the likelihood of developing problem cannabis use.

- Initiating cannabis use at a younger age increases the likelihood of developing problem cannabis use.

Cannabis Use and the Abuse of Other Substances

- **Moderate evidence of a statistical association between cannabis use and:**
  - The development of substance dependence and/or a substance abuse disorder for substances, including alcohol, tobacco, and other illicit drugs
- **Limited evidence of a statistical association between cannabis use and:**
  - The initiation of tobacco use
  - Changes in the rates and use patterns of other licit and illicit substances
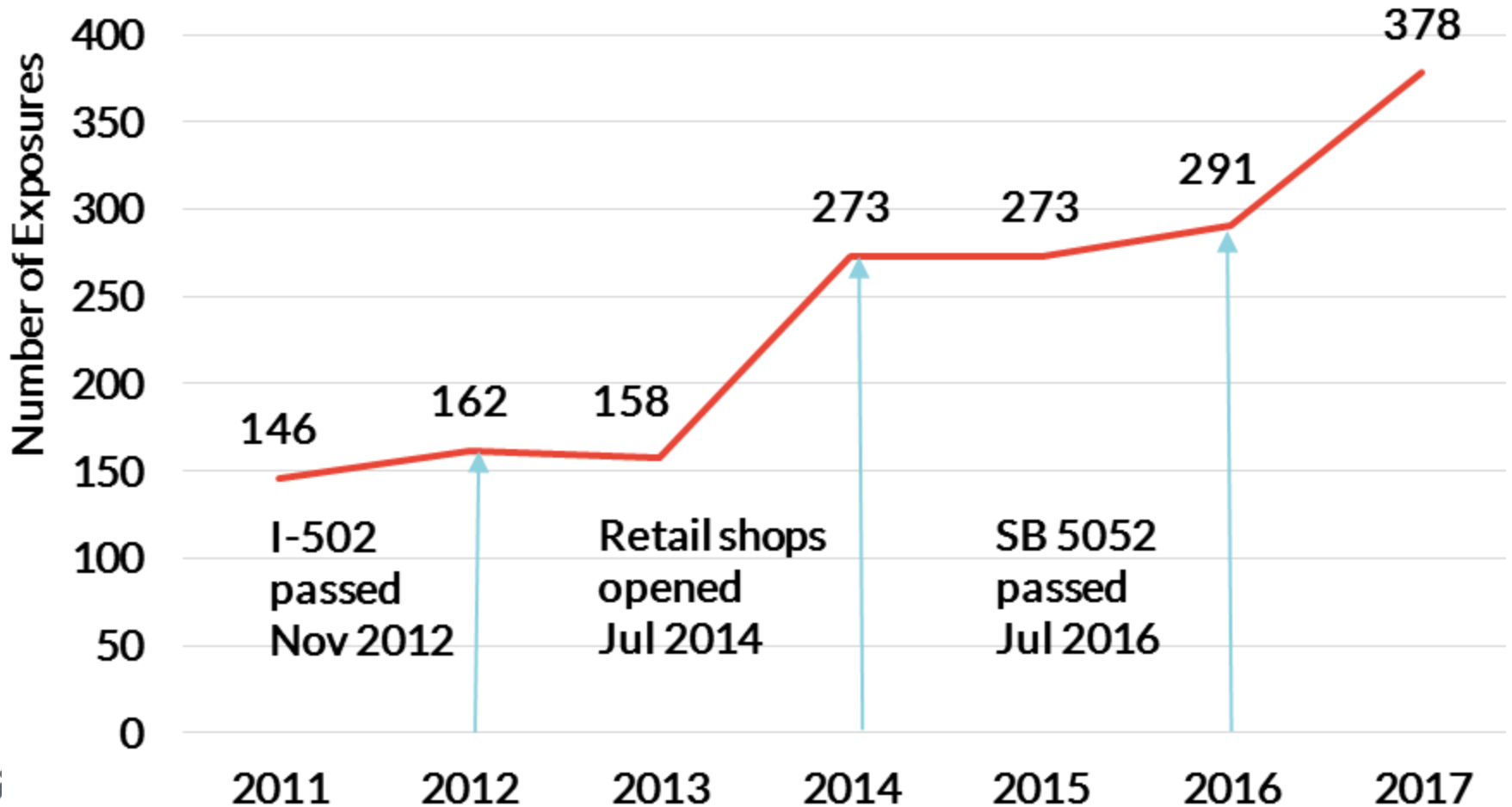
Cannabis Use and the Abuse of Other Substances, Bottom Line

- Cannabis use is likely to increase the risk for developing substance dependence (other than cannabis use disorder).
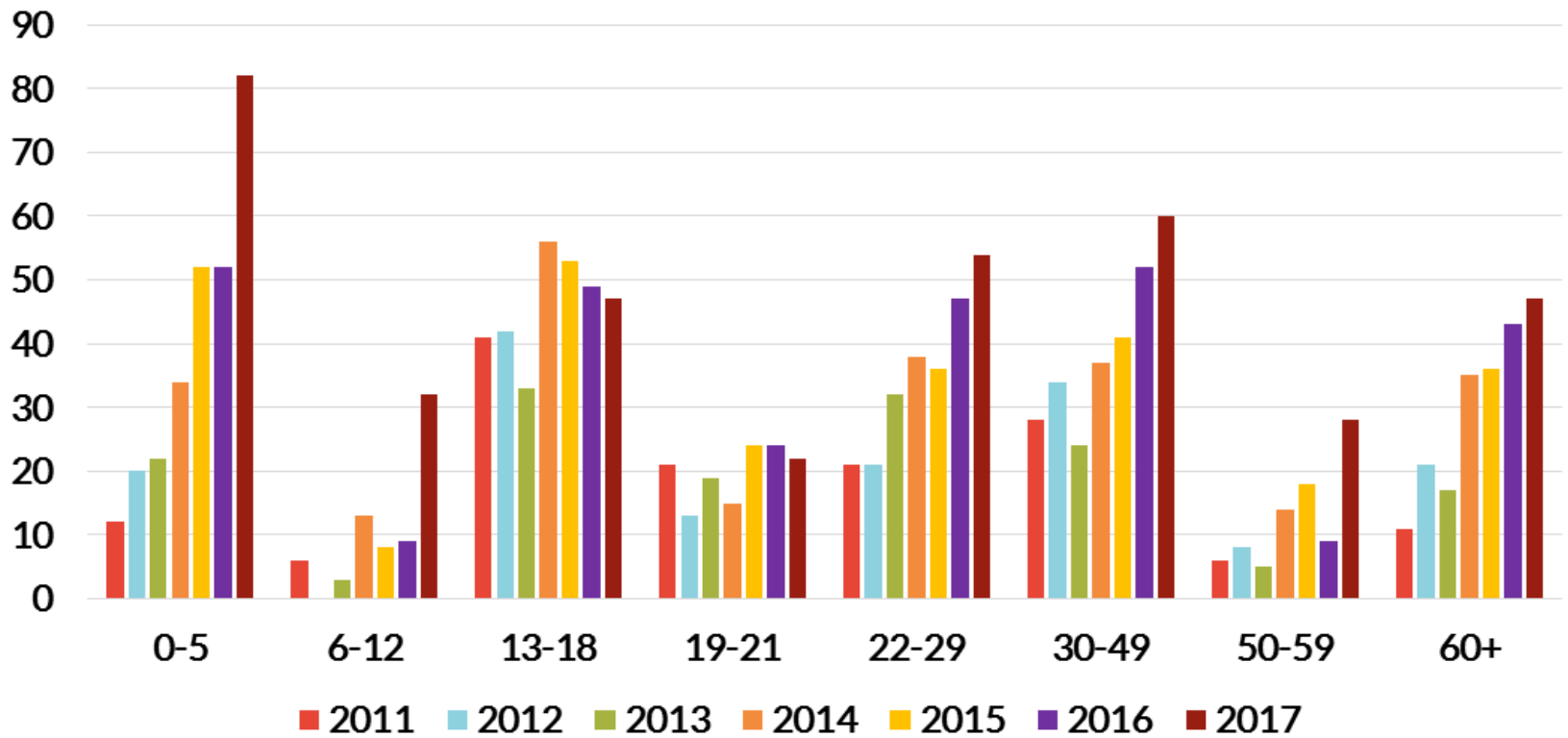
Washington Poison Center Calls
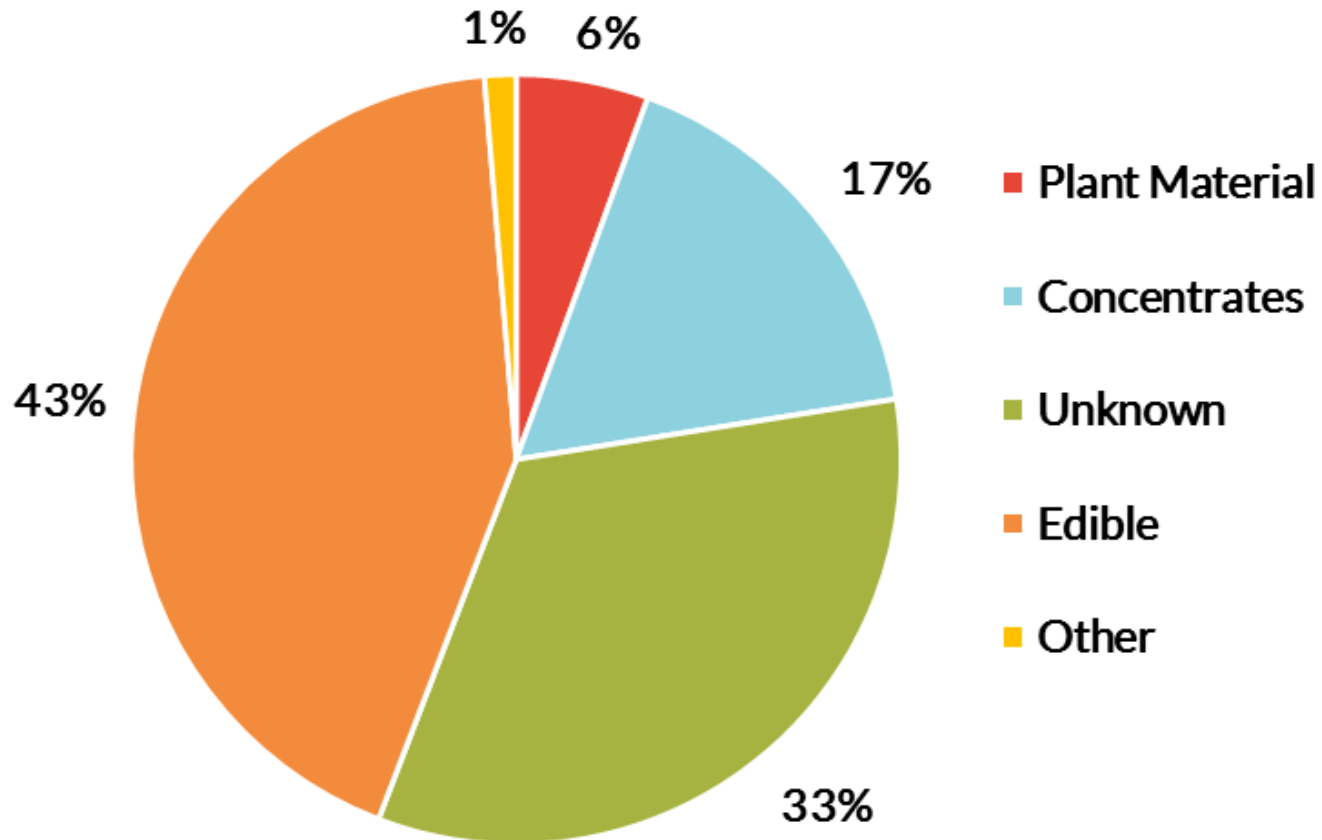

Cannabis Exposures 2011-2017

A line chart titled "Cannabis Exposures 2011-2017" with "Number of Exposures" on the y-axis (0 to 400) and years 2011-2017 on the x-axis. Data points: 2011 = 146, 2012 = 162, 2013 = 158, 2014 = 273, 2015 = 273, 2016 = 291, 2017 = 378. Annotations: "I-502 passed Nov 2012", "Retail shops opened Jul 2014", "SB 5052 passed Jul 2016".

Washington Poison Center Calls

Cannabis Exposures By Age from 2011-2017
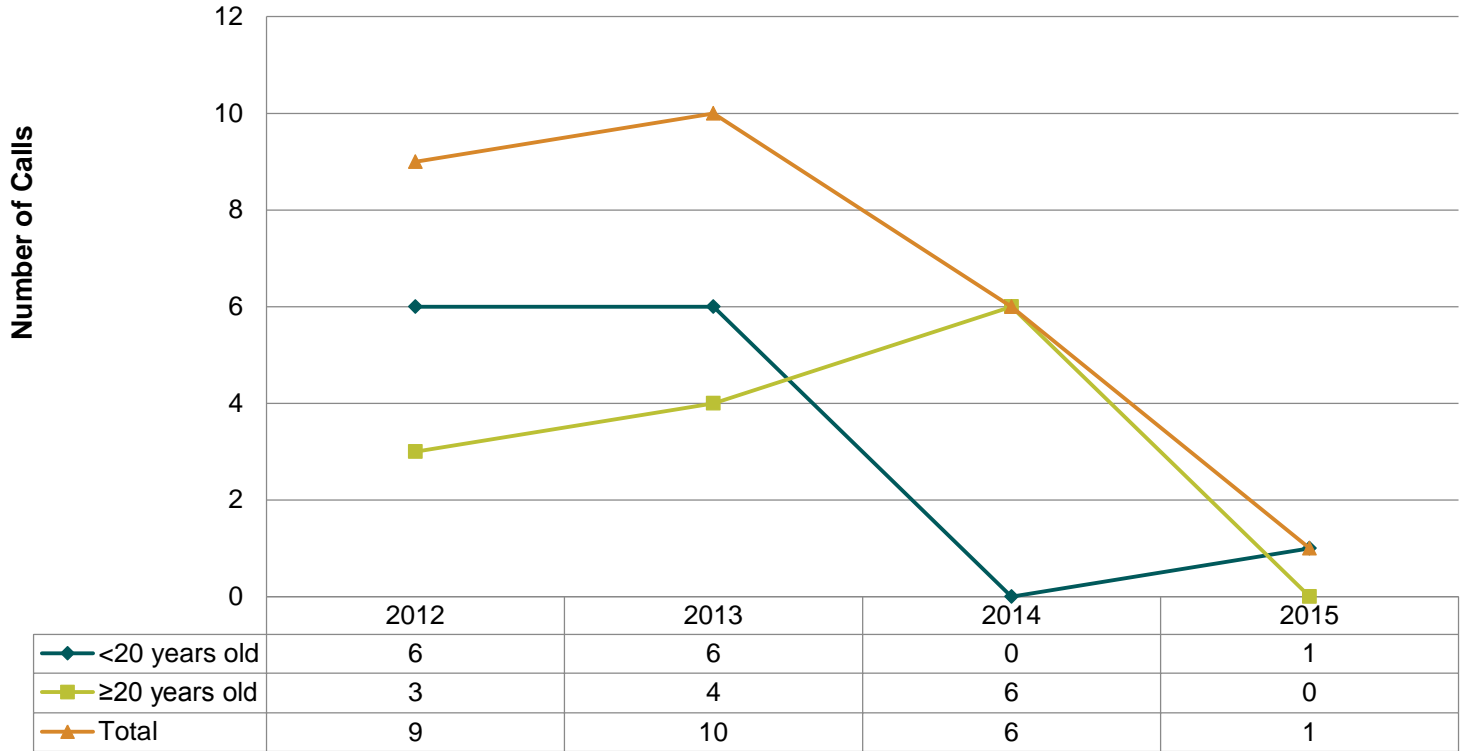
Washington Poison Center Calls

Types of Cannabis

1%   6%

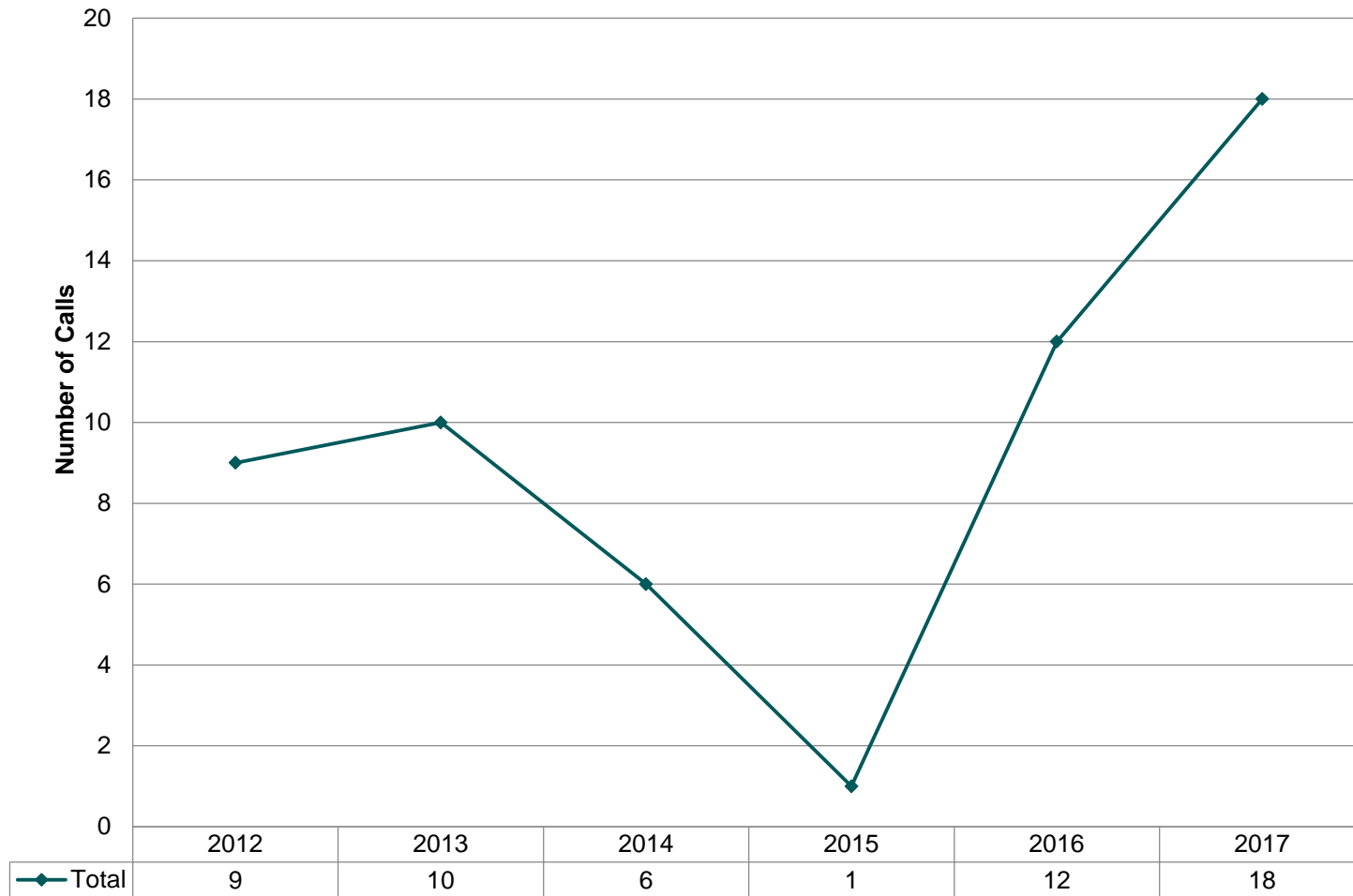17% ■ Plant Material

■ Concentrates

43%

■ Unknown

■ Edible

■ Other

33%

Washington Poison Center Calls

Types of Cannabis

- 1%
- 6%
- 17% ■ Plant Material
- ■ Concentrates
- 43%
- ■ Unknown
- 33%
- ■ Edible
- ■ Other
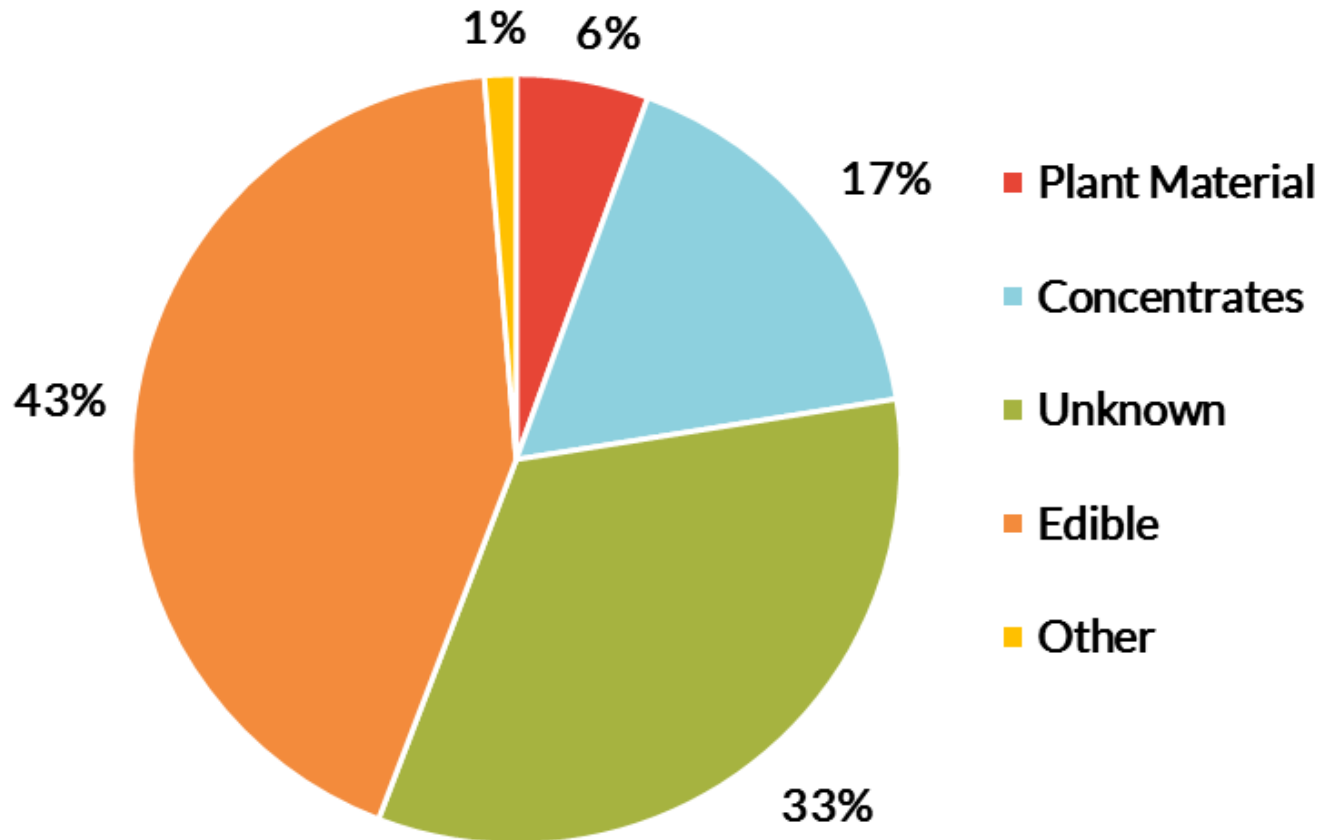
Clark County Marijuana Poison Control Calls

	2012	2013	2014	2015
<20 years old	6	6	0	1
≥20 years old	3	4	6	0
Total	9	10	6	1

Clark County Poison Control Cannabis Calls
2012-2017

	2012	2013	2014	2015	2016	2017
Total	9	10	6	1	12	18

Washington Poison Control Center Calls 2017

	Opioids	Cannabis	Nicotine
■ State	1,435	357	385
■ Clark County	36	12	18
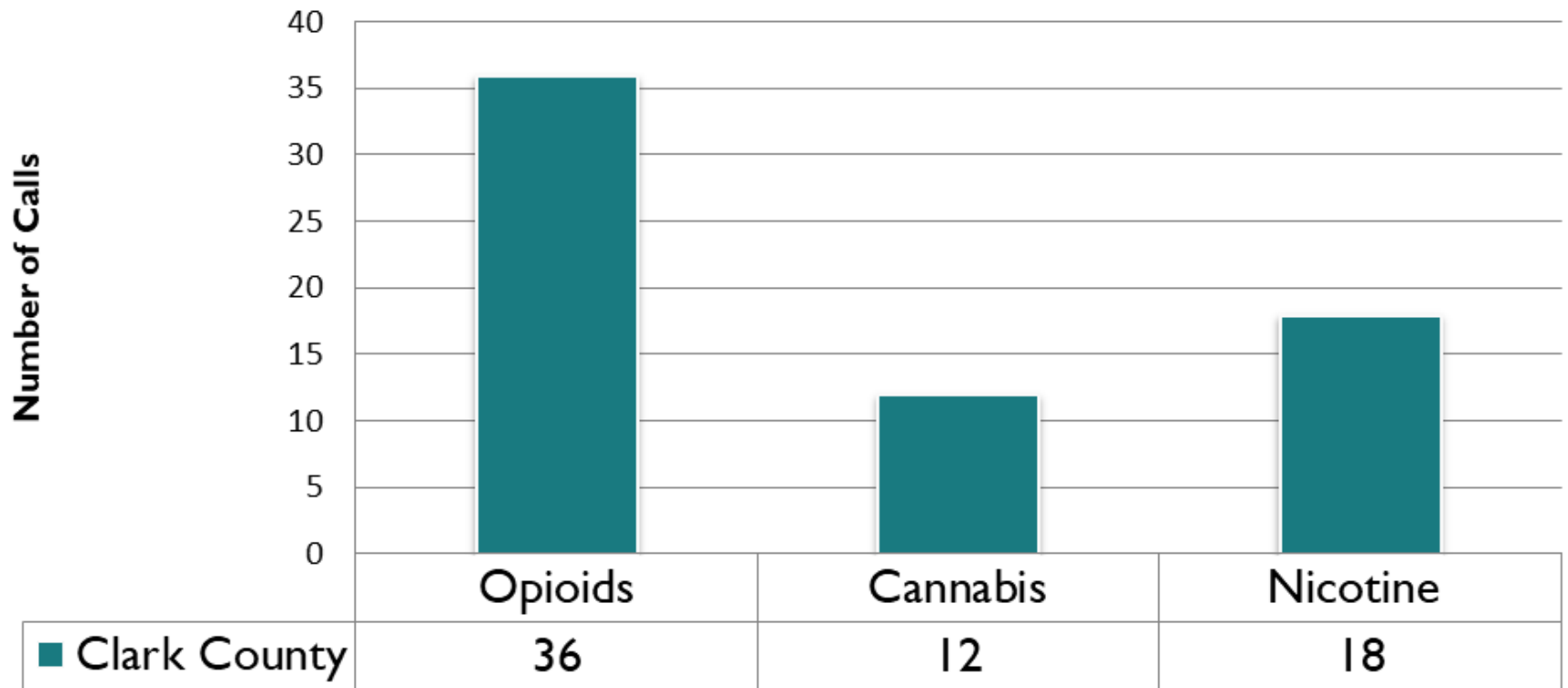
Number of marijuana-related emergency department visits by age group, Clark County WA , 2017 & 2018

Age	2017	2018
Unknown	<10	<10
00-09	<10	<10
10-19	51	61
20-29	71	100
30-39	48	55
40-49	19	38
50-59	14	32
60-69	10	19
70-79	<10	10
80+	0	<10
Total	223	322

Data Source: Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) January 1, 2017—March 28, 2019. (Emergency departments included in analysis were Legacy Salmon Creek and PeaceHealth Southwest)

Number of marijuana-related emergency department visits by chief complaint medical grouping, Clark County WA, 2017 & 2018

Chief Complaint Medical Grouping	2017	2018
Gastrointestinal	73	83
Injury	34	39
Neurological	14	24
Other	98	161
Influenza-like illness, rash, respiratory, fever, muscle weakness, or loss of consciousness	10	22
*Note: Individual ED visits may have more than 1 chief complaint medical grouping		

Data Source: Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) January 1, 2017—March 28, 2019. (Emergency departments included in analysis were Legacy Salmon Creek and PeaceHealth Southwest)
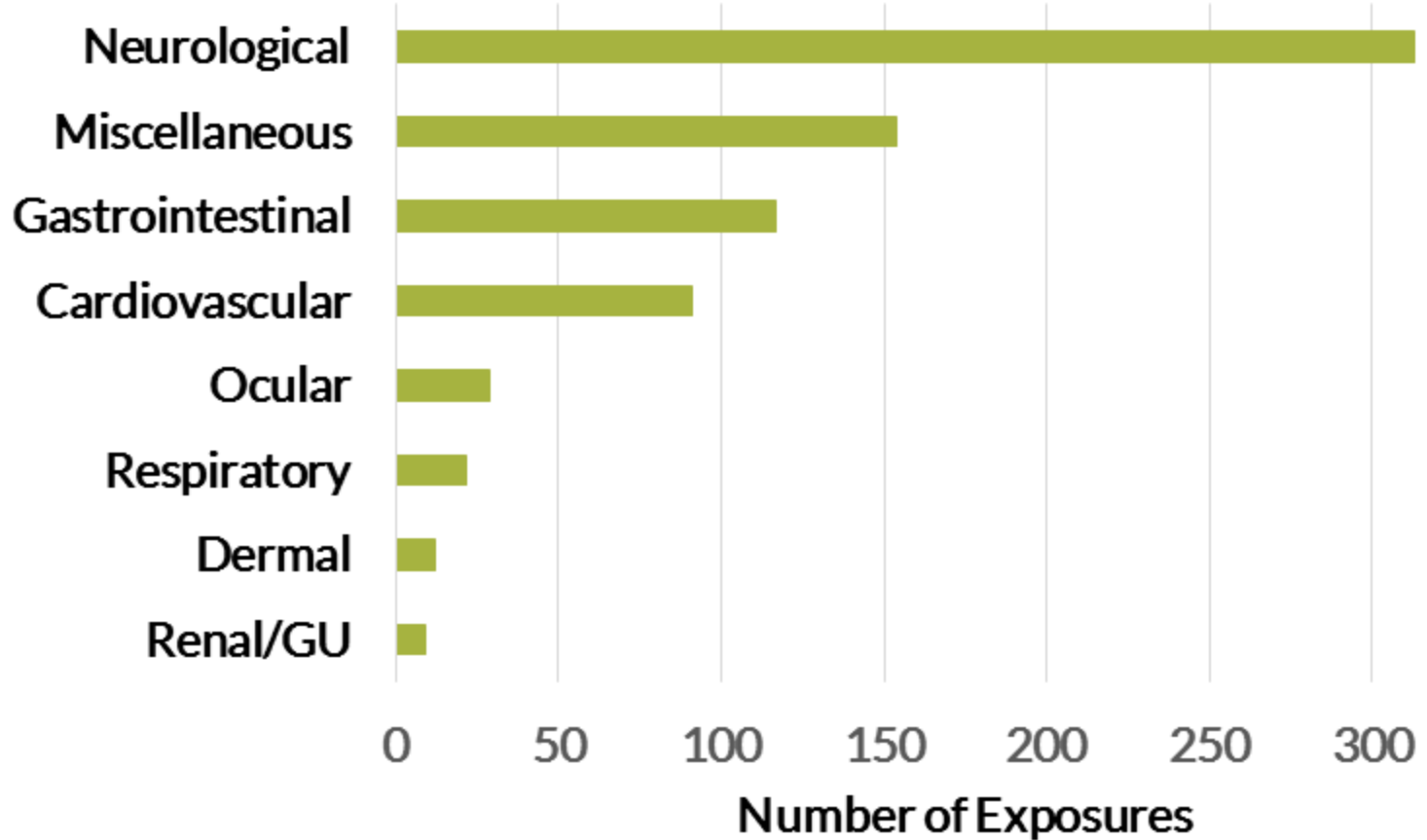
Marijuana related inpatient hospitalizations in Clark County, 2012-2017
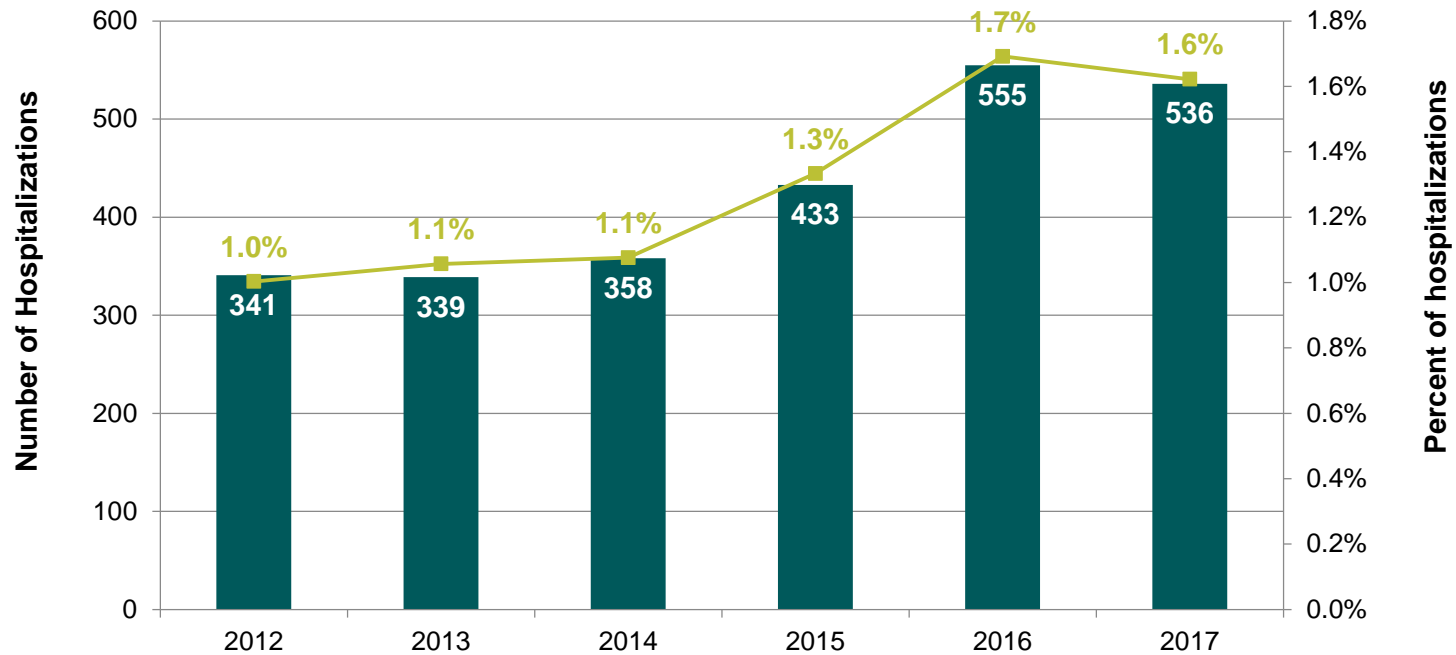
Comprehensive Hospital Abstract Reporting System (CHARS) 2012-2017. Washington State Department of Health, Center for Health Statistics

Washington Poison Center (2017 Annual Toxic Trend Report: Cannabis)