



RGGA

MARIJUANA IS NOW LEGAL, WHAT WILL THE FUTURE HOLD?

Georgiana Pascutiu, MD, DBIM

VP and Medical Director, Global Medical Support

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Cannabis is

- A. A “stepping-stone” drug paving the way to the use of harder drugs?
- B. Like alcohol, a largely harmless indulgence, dangerous only when not used in moderation?
- C. I don't know

The two big questions

- **Is it safe?**
- **Is it effective?**

AGENDA

- **Basic Facts (history, main components, how it works)**
- **What can marijuana do?**
- **How it might help us?**
- **How it might hurt us?**

LEARNING OBJECTIVES

- **What do we know so far?**
- **What we need to find out?**
- **What will the future hold?**

HISTORY AND ORIGINS



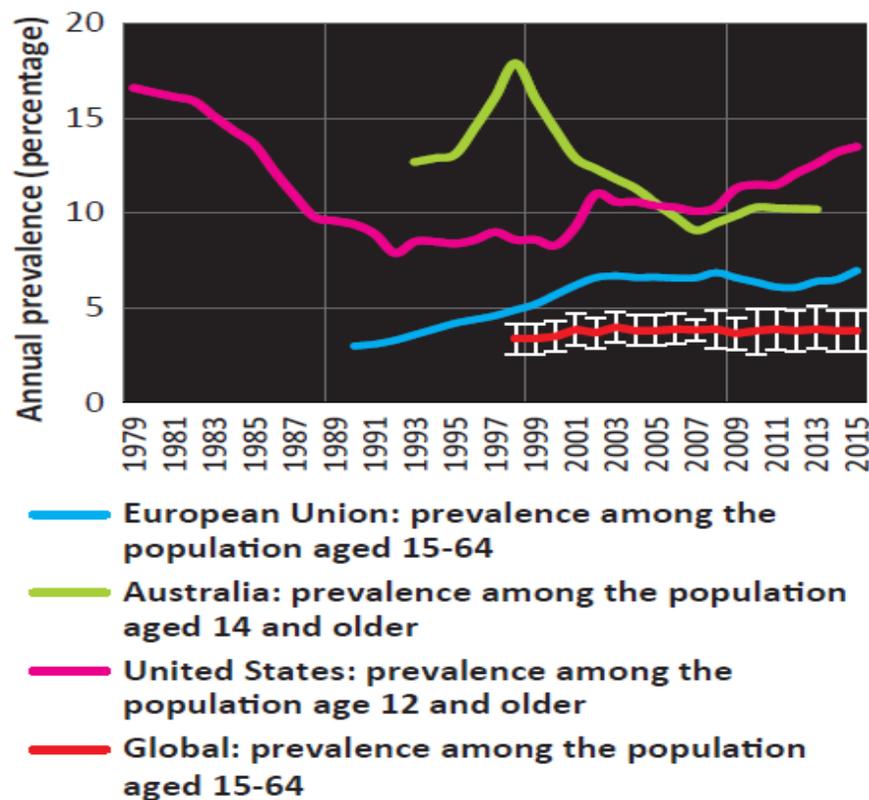
Current State

2017 Users

Cannabis 188 millions	Opioids 53 millions	Amphetamines 29 millions	Ecstasy 21 millions	Cocaine 18 millions
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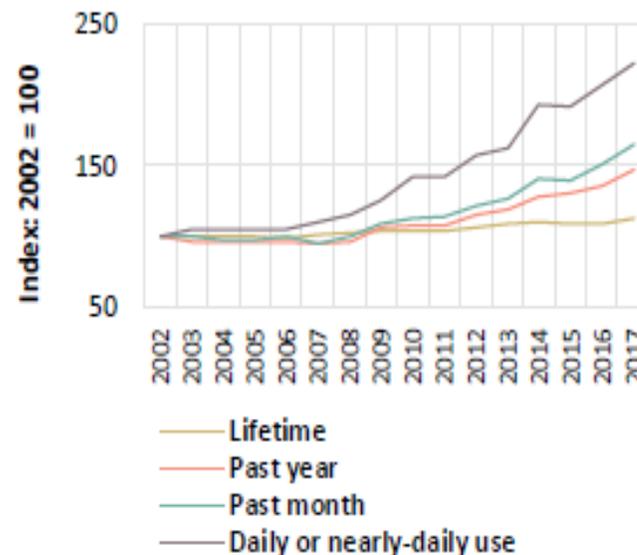
Current State

FIG. 28 Annual cannabis prevalence rates in the United States, the European Union, Australia, and at the global level, 1979-2015



Sources: UNODC, responses to the annual report questionnaire; SAMHSA, EMCDDA and the Australian Institute of Health and Welfare.

FIG. 14 Trends in cannabis use among the adult population (aged 18 and older) in the United States of America, 2002-2017

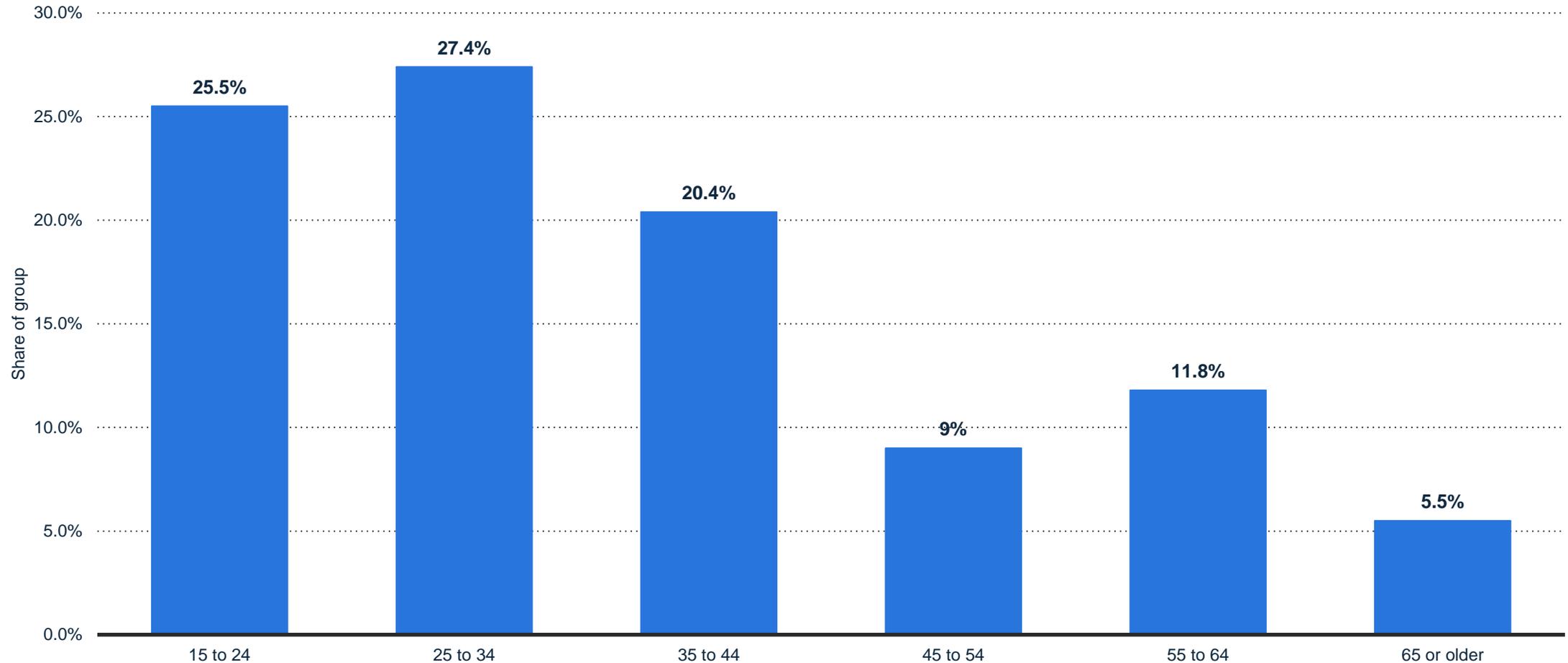


Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2017 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2018).

Regulations Legalizing Recreational Marijuana

	Netherlands	Uruguay	United States	Canada	South Africa
Min age (years)	≥18	18 (registered pharmacies and users)	21	≥18 (Ontario 19)	Yet to be decided
Personal possession	5 g/transaction/day	40g/month	28.5 – 57g	30g	Yet to be decided
Home cultivation	5 plants	6 plants	6-12 plants	4 plants	Yet to be decided
Retain transaction limit	Not Set	40g/month, 10g/week	7-28.5g	28 g/week (Self-regulated)	Illegal to trade, sell to others
Edibles	NA	NA	5-10mg THC per serving	NA	NA
Max THC	15% (Industry avg 17.8%)	15%	Not Set	?	Not Set
Cannabis clubs	2000 per coffee shop	15-45 members	NA	NA	
With alcohol	No	NA	NA	No	
Avg retail price (after tax)	NA	\$1.20	\$11.5 – 14.0	\$14 for 2g bag	
g = grams, mg = milligrams					

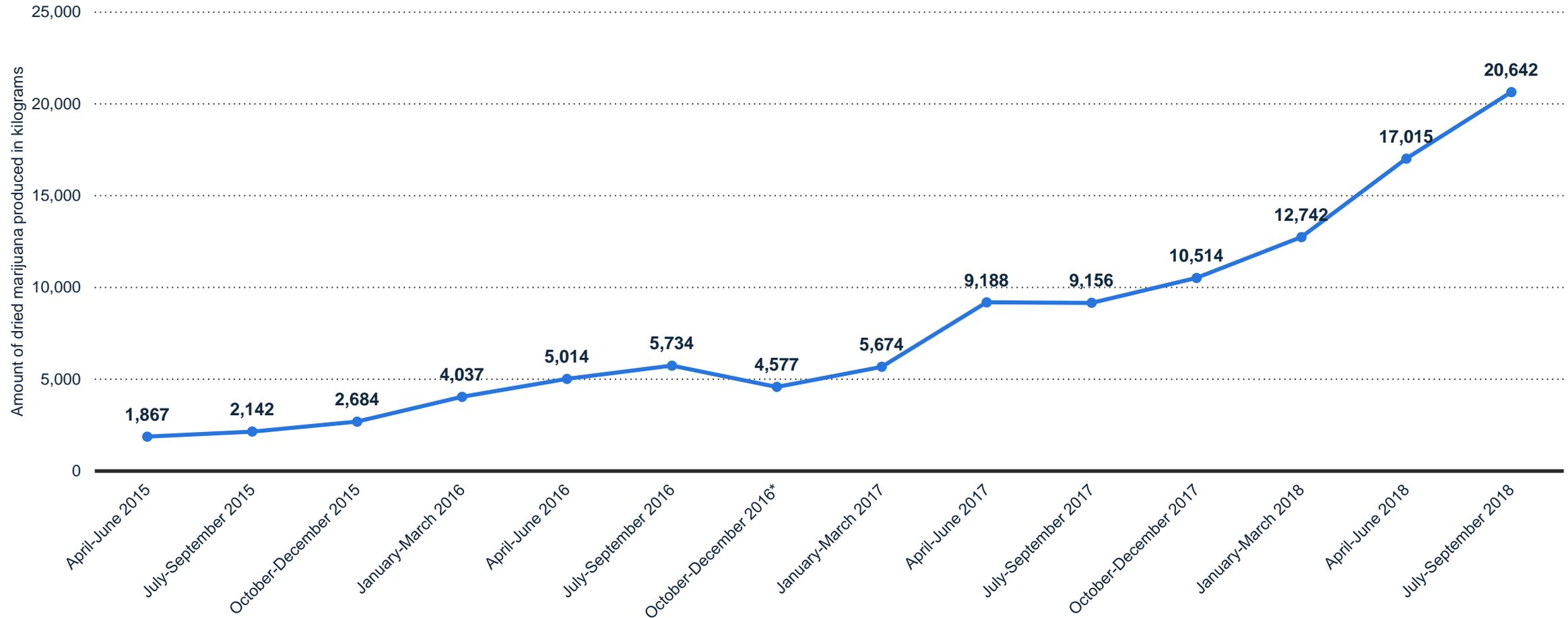
Cannabis consumption in the past three months in Canada as of June 2019, by age group



Statista, StatCan

Canada; ; May to June, 2019; 15 years and older; 6,466 Respondents; non-institutionalized persons

Quarterly amount of dried marijuana produced for medical purposes (Canada, April 2015-September 2018)



What do people think and say about cannabis

- **“A plant whose virtues have never been discovered”**
- **“A short term solution to a much deeper issue”**
- **"Why drink and drive if I can smoke and fly?"**
- **"The effect of it is euphoria."**
- **“Marijuana is an herb and a flower. God put it here."**

HOW ADDICTIVE IS MARIJUANA?

- A. 5%
- B. 9%
- C. 28%

MARIJUANA BASIC FACTS

- The two main cannabinoids from the marijuana plant that are of medical interest are THC and CBD (**phytocannabinoids**)
- **THC** = main mind-altering ingredient that makes people "high"
- **CBD** = might modulate THC effects, has beneficial effects (e.g. anti-inflammatory, muscle relaxant)
- **The body also produces its own cannabinoid chemicals (endocannabinoids)**

ANANDAMIDE is

- A. Also called the bliss molecule?
- B. Found in chocolate?
- C. Secreted by our brain?
- D. Natural THC molecule?
- E. A neurotransmitter?
- F. All of the above

ANANDAMIDE AND DOPAMINE

- **Anandamide** affects our energy, mood, appetite and perception of time
- Our body produces **dopamine** when having pleasurable activities
- The reward system uses **anandamide to release dopamine** in small amounts
- **SO MORE THC MEANS MORE DOPAMINE?**

- **Acute THC administration causes increased dopamine release and neuron activity**
 - the brain is releasing much more dopamine which lasts much longer
- **THC takes the place of anandamide, which usually keeps dopamine regulated and disrupts the typical operation of the brain**
- Dopaminergic blunting associated with long-term cannabis use



Endocannabinoid System (ECS)

CB1 and CB2 Receptors

Two Main site where compounds activate throughout the body



CB1 receive THC molecules



CB2 receive CBN molecules

Is marijuana good for treating your anxiety?

- A. Yes
- B. No

MARIJUANA AND THE MIND

Association between cannabis and anxiety

- THC in low doses can be calming, high dose gives anxiety
- Psychological symptoms that people medicate with cannabis are the same as marijuana chronic withdrawal symptoms (anxiety, panic attacks, insomnia)
- Studies might be biased as cannabis might not induce anxiety but people with anxiety self-medicate with marijuana

Research

- 31 studies were analyzed to investigate relationship between cannabis use and anxiety in the general population
- **Small positive association between anxiety and cannabis use (OR = 1.24)**

Cannabis and Depression

- 11 longitudinal and prospective studies comprising 23 317 individuals
- The **OR** of developing depression for cannabis users in young adulthood compared with nonusers was **1.37**.
- OR for suicidal ideation 1.5

Psychotic episodes and schizophrenia

- The relationship between cannabis use and risk of developing symptoms of psychosis has been well established in many different review articles.
- Chronic exposure to THC predispose people to mental illness
- **The greater the THC content, the greater the risk, more research is needed**
- The Canadian context may offer an unique research opportunity (universal healthcare)

- Multi-centric Case Control Study
 - 901 patients with first-episode psychosis and 1237 controls across 11 sites in Europe
 - Daily use of high-strength cannabis is linked to having a 5 times greater risk of a psychotic episode.

Cannabis and Schizophrenia

- The earliest such study 15-year prospective investigation of cannabis use and schizophrenia in 50,465 Swedish conscripts
- **Longitudinal** studies: demonstrated a dose-response relationship between cannabis use and psychosis risk
- **Temporal relationship**, with cannabis use preceding the onset of psychosis
 - those who had tried cannabis by age 18 were 2.4 times more likely to be diagnosed with schizophrenia than those who had not
 - The risks were substantially reduced but still significant after statistical adjustment for variables that were related to the risk of developing schizophrenia.
- Numerous follow up longitudinal studies confirmed same findings

Marijuana and risk of stroke and heart attack

- Heart rate and blood pressure increase, forcing your heart to work harder
- **Emerging evidence shows an increased risk for heart disease and stroke**
- Study: data from the Nationwide Inpatient Sample (18-55 years) **marijuana use was independently associated with a 26 percent increase in the risk of stroke** (after adjustment for obesity, HTN, smoking)

Marijuana and driving

- Law enforcement will be able to use **standardized field sobriety test and oral fluid drug screening device** and to test drivers for drug impairment but
 - Testing for THC is difficult as the substance remains in the bloodstream for a long period of time, even if the user is no longer intoxicated
- **Meta analysis showed that**
 - cannabis doubled the risk of traffic accidents and risk is significantly higher when alcohol is also involved

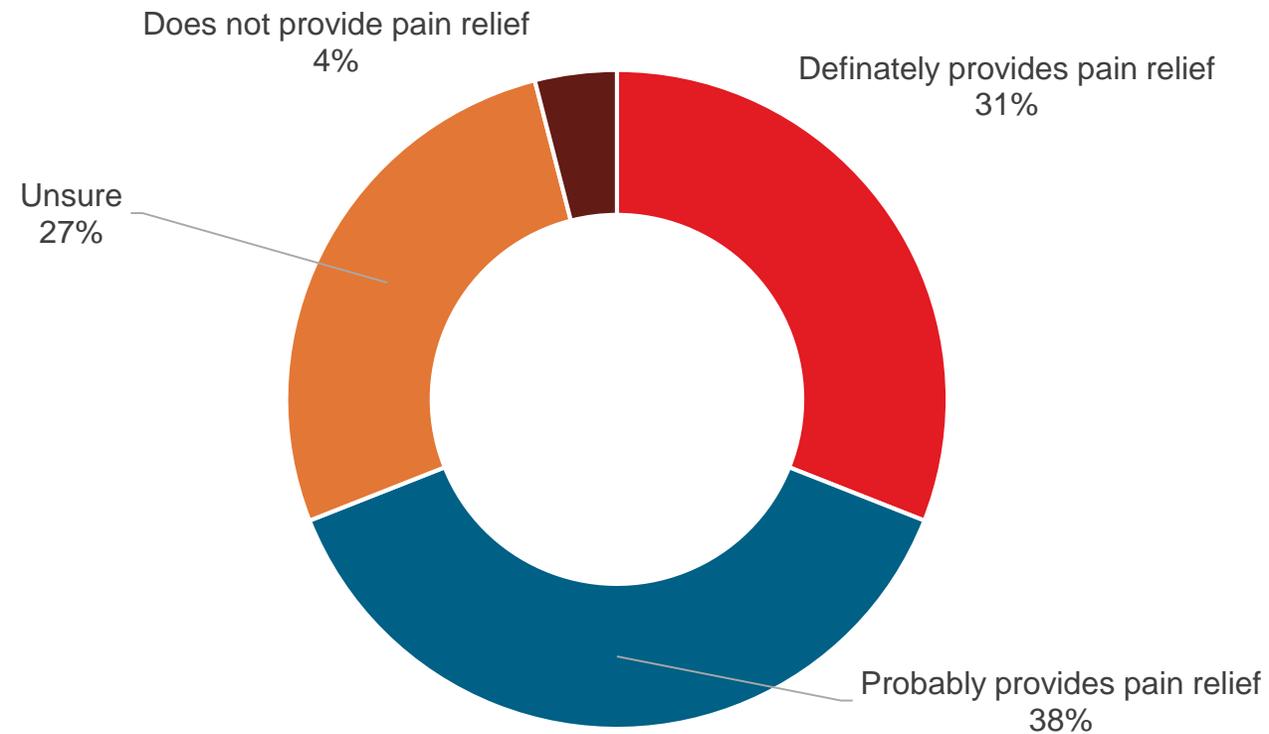
Effects on work and social life

- Moderate to chronic use of cannabis products in adolescence is associated with
 - Higher peer drug association
 - Poorer educational outcome
 - Low work commitment (incapacitation at work, skipping work)
- **Workplace concerns:**
 - **Safety: employees operating motor vehicles and heavy machineries**
 - **Attendance**
 - **Work performance**
- Disability products

BENEFITS?

Medical Marijuana for Pain Relief

Percentage of older U.S. adults who felt medical marijuana provides pain relief as of 2017



Opioid Use Lower In States That Eased Marijuana Laws

- Some studies have suggested that medical marijuana legalization might be associated with decreased prescription opioid use and overdose deaths
- USA time-series analysis: states with medical cannabis laws had a **24.8% lower mean annual opioid overdose mortality rate** compared with states without medical cannabis laws

Marijuana laws and opioid mortality

- Marijuana legalization causes a significant decline in opioid mortality (especially deaths from synthetic opioids)
- Access to recreational marijuana reduces opioid mortality in the range of 20%–35%

Treatment for Multiple Sclerosis

- **Sativex:** botanical spray containing THC and CBD 1:1
- In some trials, THC:CBD spray significantly reduced neuropathic pain, spasticity, muscle spasms and sleep disturbances

FDA Approves First Drug Derived from Marijuana

- **Epidiolex[®] (cannabidiol, or CBD)**
 - treatment of two **severe pediatric seizure disorders**, Lennox-Gastaut syndrome and Dravet syndrome
- **May 2019 Study: 199 children, average age 9, 14 weeks of treatment**
 - seizures with convulsions fell by
 - 47% in the high-dose group (20 mg/kg)
 - 56% in the low-dose group (10 mg/kg)
 - 30% in the placebo group

Marijuana Salad

- Can you get high if you eat a salad made of marijuana leaves?



The Three Big Questions

- Will people start using more?
- Will we have safer weed?
- Does it fix the underlying problem or is just a band aid?

FUTURE OF MARIJUANA

- **Countries where it has been legal for a while? No death epidemic**
- **But did enough time pass to assess the risks and possible benefits of cannabis?**
- **Opportunity to research this plant**

KEY POINTS

- **THC is a mind altering substance**
- **The key is the dose, the THC content and the CBD/THC ratio**
- **THC may cause more damage to a young brain (until age 25)**
- **Legalized but regulated might create opportunities to gather much needed evidence to study this plant**
- **Very complex substance so difficult to study**

- **High quality research is limited**
- **Marijuana products should be tested and quality control should be implemented**
- **There is no third-party verification system in place for laboratories**

Stay tuned!

THANK YOU!

QUESTIONS?