

Cannabis and Health in the Young Adult



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Cannabis and Health in the Young Adult: What's the buzz about?



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What this presentation is **NOT**:

It is not a ‘cannabis is evil’, ‘just say no’ type of talk



This is about **information** so that you can make **informed decisions**



Cannabis use in Canada: The sobering statistics



- Prevalence of use has significantly increased over last 20 years
- 12 million people (34% of population) have used in their lifetime
- Cannabis abuse/dependence rate greater than all other illicit drug abuse/dependence rates combined
- Canada's youth has the highest 12-month prevalence rate of cannabis use out of all developed countries (Adamson 2013) [22% age 15-19; 26% age 20-24]
- Almost 1 in 20 youth reported using cannabis daily or almost daily (Young 2011)

Canadian Provincial School Surveys



	Past-year cannabis use (%)					Daily or almost daily cannabis use (%)		
	Grade					Grade		
Province	7	9	10	12	Total	10	12	12
ON (2013)	1.7	14.6	24.5	39.2	23.0	2.0	5.1	5.1
QC (2013)	4.3	24.9	32.2	-	22.9	1.2	-	-
NB (2012)	6.0	27.0	32.0	45.0	28.3	-	-	-
NS (2012)	7.0	32.7	39.9	54.7	34.7	7.0	11.1	11.1
NL (2012)	4.2	27.4	40.2	46.5	30.0	8.3	8.9	8.9

**Any substance use in
2012 among students in
grades 7, 9, 10 & 12**

SUBSTANCE	PERCENTAGE
Alcohol	49.0
Cannabis	34.7
Nicotine	13.2
Non-medical pain pills	11.7
Non-medical stimulants	7.0
Psilocybin or Mescaline	5.7
Non-medical tranquilizers	5.0
Cough or cold medicine to get high	5.0
MDMA (Ecstasy)	4.7
Cocaine or crack	4.1
Inhalants	3.3
LSD	2.3
Salvia	2.3
Methamphetamine	2.1
Injection drug use	0.5
Caffeinated energy drinks	64.3

Methods of Cannabis Use

Joint



Pipe



Bowl



Edibles



Product Potency: What you can find online.....



- *‘The strongest strains are obviously those with the highest THC content. Generally speaking, anything that surpasses **20 %** could be considered pretty potent..... there are strains that tend to express higher levels of THC thanks to strong genetics and selective breeding.’*
- ***Indica Kosher Kush**; ‘always breaches 20%’*
- ***Bruce Banner**; ‘appropriately named after the Hulk’s alter ego, is a heavy-duty hybrid with a THC high-water mark of almost 29 percent. Rated the strongest strain in 2014 by High Times following its victory in the 2013 Denver Cannabis Cup, Bruce Banner has since carved itself quite the reputation. Powered by OG Kush and Strawberry Deisel genetics, Bruce Banner delivers a dizzying punch of euphoria that anchors your body in deep relaxation.’*
- ***Ghost Train Haze**; 25%*
- *Death Star, Strawberry Cough, The White, Red Dragon, White Fire, Gorilla Glue*

Methods of Cannabis Use: Dabbing

“Shatter”



“Wax”



- Typically use butane to extract oil.
- Very potent 80 to 90 % THC.

Overall however – the THC:CBD ratio has changed over the years in all products

SYNTHETIC CANNABINOIDS



- First developed as pharmacological research tools to study endocannabinoid system
- Synthetic cannabinoids sprayed on herbal plants
- Marketed as legal alternatives to cannabis
 - wide variation between batches
 - Spice, K2, Kush, Black Mamba, Moon Rocks, Cloud 9, Brain freeze
 - Potent, unpredictable, toxic
- Not detected in standard urine drug screens
- Potent CB1 agonists





So what are the effects of cannabis on youth and young adults?

To consider:

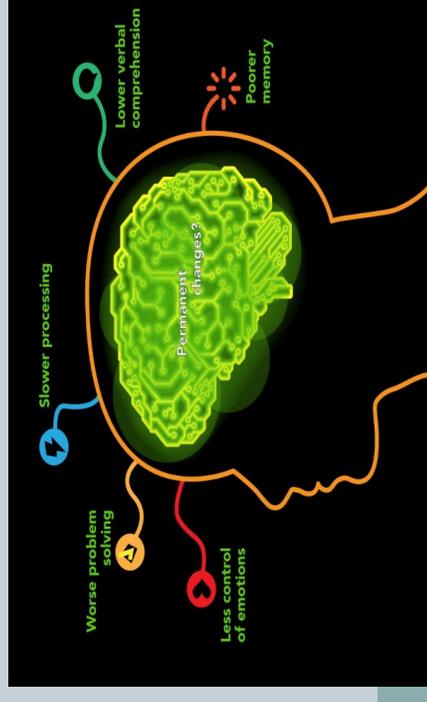
- Occasional use vs regular use
- Age of use; age of regular use
- Potency of product
- Acute (short term) vs chronic (long term) effects

Acute (Short Term) effects

- Slows reaction times, decreases attention, affects fine motor coordination
 - What this affects: **ability to drive, operate equipment, workplace safety**
- Decreases attention, ability to remember and learn, and making decisions
 - What this affects: **school and work performance**
- Affects mood and feelings
- Affects mental health

Chronic (Long term) effects

- Affects lung health (worsening respiratory symptoms and more frequent chronic bronchitis episodes)
- Addictions
 - 9% of any users will have cannabis use disorder
 - 16% if start using during adolescence
- Affects mental health (psychosis, anxiety, depression)
- Affects cognition (school/work performance)





Cannabis use that begins early in adolescents that is frequent and that continues over time is more likely to bring about harms. Some of these harms may never go away.

Youth and young adults are especially vulnerable to the negative effects of cannabis



Digging a little deeper.....

Understanding the potential outcomes of regular cannabis use during adolescence and young adulthood on mental health (with a focus on psychosis)

Appreciate the role of the endocannabinoid system on youth and young adult brain development and how regular cannabis can affect this [Dr Crocker]

What is **your** role in knowledge translation in this area





Cannabis and Mental Health



National Academies of Sciences, Engineering, Medicine in “*The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*” (January 2017) state:

...substantial evidence of a statistical association between cannabis and the development of schizophrenia or other psychosis

....moderate evidence of a statistical association between cannabis and increased incidence of suicidal ideation/attempts/completion

..... moderate evidence of a statistical association between cannabis and increased incidence of social anxiety disorders

.... moderate evidence of a statistical association between cannabis and increased incidence of increased mania/hypomania in individuals with bipolar disorder

What is the link between cannabis use and schizophrenia?



Epidemiologic Studies

- Longitudinal studies in the general population are necessary to examine the link between cannabis and psychosis
- Swedish conscript study (Andreasson 1987)
 - 45,570 conscripts followed up after 15 years
 - Those who smoked by the age of conscription had 2X the risk of developing schizophrenia (OR=2.3)
 - Findings confirmed in follow up of same cohort after 27 years
 - Dose-response relationship observed: heavy users were 6X more likely than non-users to develop schizophrenia (heavy use = used >50 times prior to age 18)



Epidemiologic Studies



Country	Study design	Sample size	Follow up	Odds Ratio (95% CI)
Israel (Weiser et al)	Population based	9,724	4-15 years	2.0
Netherlands (Ferdinand et al)	Population based	1,580	14 years	2.8
Germany (Henquet et al)	Population based	2,437	4 years	1.7
United Kingdom (Wiles et al)	Population based	8,580	18 months	1.5
Greece (Stefanis et al)	Birth cohort	3,500	NA	4.3

Epidemiologic Studies – Age of onset of use

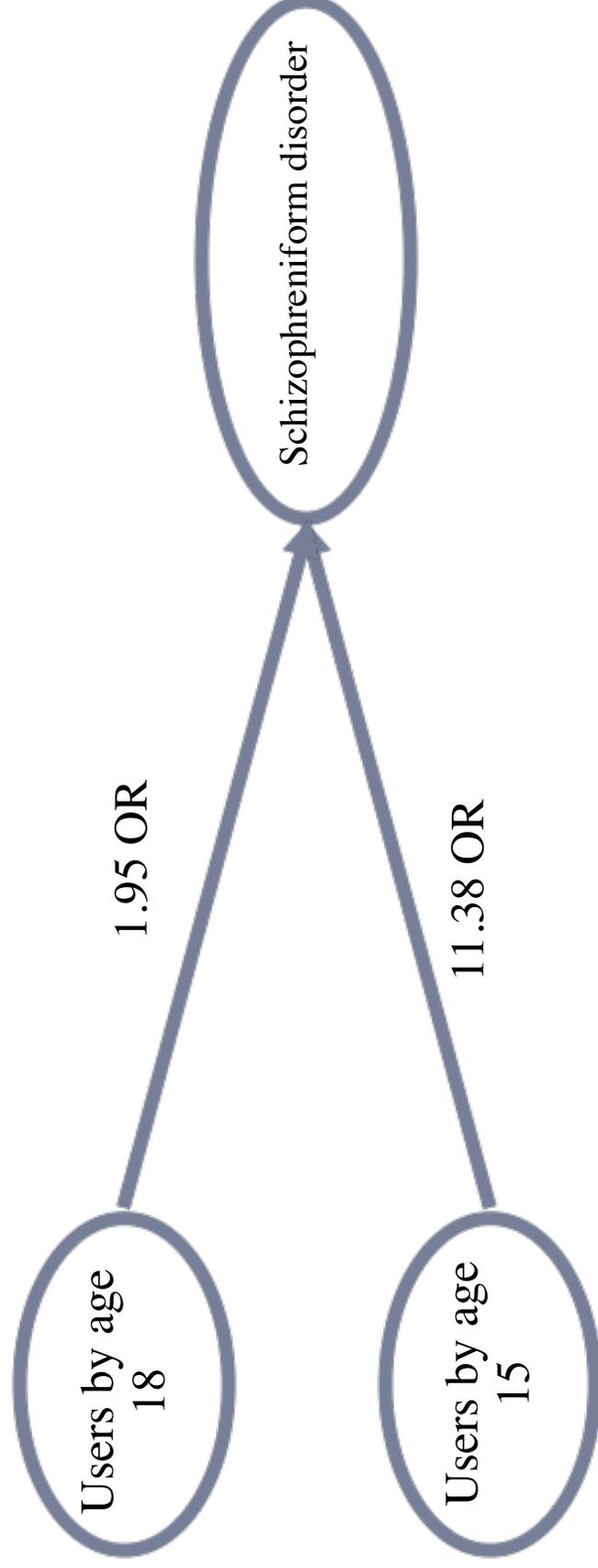
Epidemiologic studies have found that the **age of first use of cannabis** may be a key factor in the development of psychosis e.g. New Zealand Birth cohort study

- Ten evaluations of 1037 children from the age of 3.
- Quantification of drug consumption at 15 and 18 years of age.
- At age 26, 96% were interviewed using the Diagnostic Interview Schedule (DIS) for DSM-IV.

Arseneault L, et al. *BMJ*. 2002.

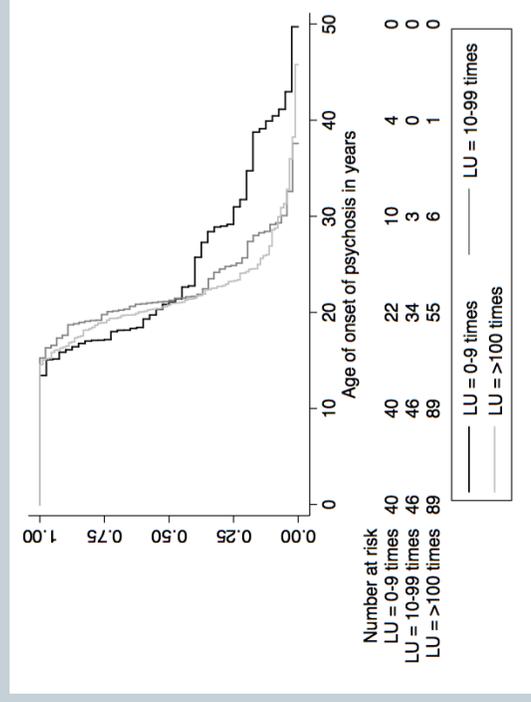


Cannabis users with schizophreniform symptoms by 26



Cannabis and Age of Onset of Psychosis

Recent studies have also indicated that early cannabis use is associated with a decrease in the age of onset of schizophrenia (e.g. Sugranyes et al)



Dalhousie/Edmonton Study

The extent of lifetime cannabis use was associated with earlier age of onset of psychosis (N=175)

- Comparing those with lifetime 0-9 times use to those with more than >100 times, $p = 0.0381$
- *Lodhi et al; Brain and Behavior, 2017*

High Potency Cannabis and Psychosis

This has been more studied in Europe than in North America

Incidence of psychosis differences has been observed in countries with/without use of high potency cannabis use (Hannah Jongasma et al; EU-GEI study)

Cases of psychosis being reported with ‘wax dabs’ (e.g. Pierre et al)

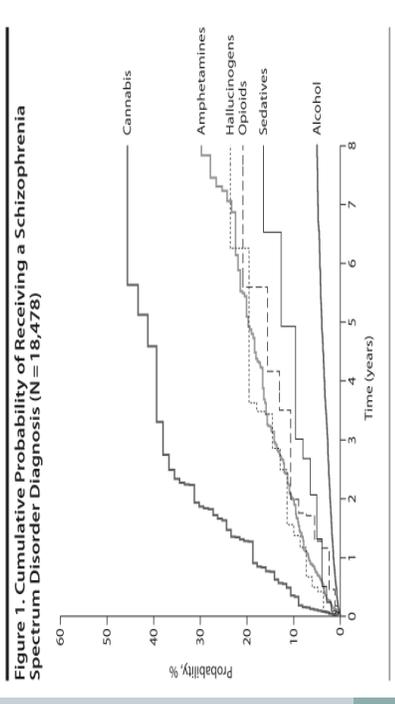
“spiceophrenia”; symptoms due to synthetic cannabinoids (e.g. Papanti et al. Fattore et al)

Daily users of high-potency cannabis experiencing their first symptoms of psychosis on average 6 years younger (Di Forti et al)

Di Forti; Lancet Psychiatry 2015

	Odds Ratio (95% CI)	Prevalence of exposure in FEP
Daily cannabis use	3.04 (1.91-7.76)	123/410 (30%)
Skunk use	2.91 (1.52-3.60)	218/410 (53%)
Daily Skunk use	5.40 (2.80-11.30)	103/410 (25%)

Niemi-Pynttari et al; J Clin Psychiatry 2013



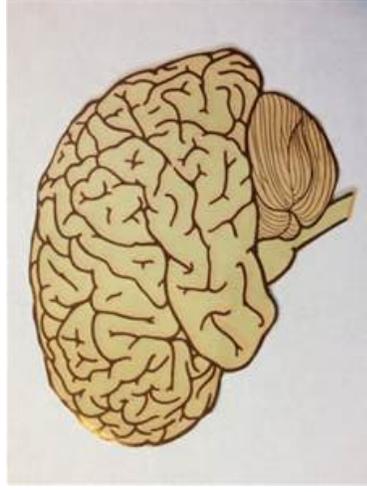
Why a greater risk in those who start early?



Why a greater risk in those who start early?

1. Reflects an increased propensity of young people with mental health/psychotic experiences to start cannabis use (reverse causality)
2. Higher cumulative exposure to cannabis in early users
3. Increased vulnerability to THC during critical phase of brain maturation

Another Variable to Consider in Cannabis and Mental Health Interaction?

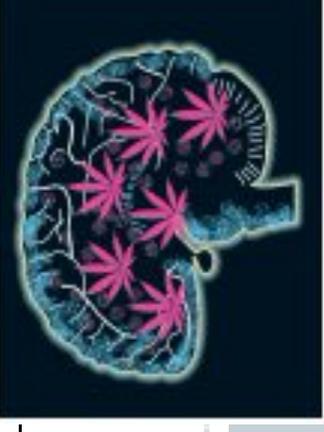


+ ? +



↑
Psychosis
Anxiety
Depression

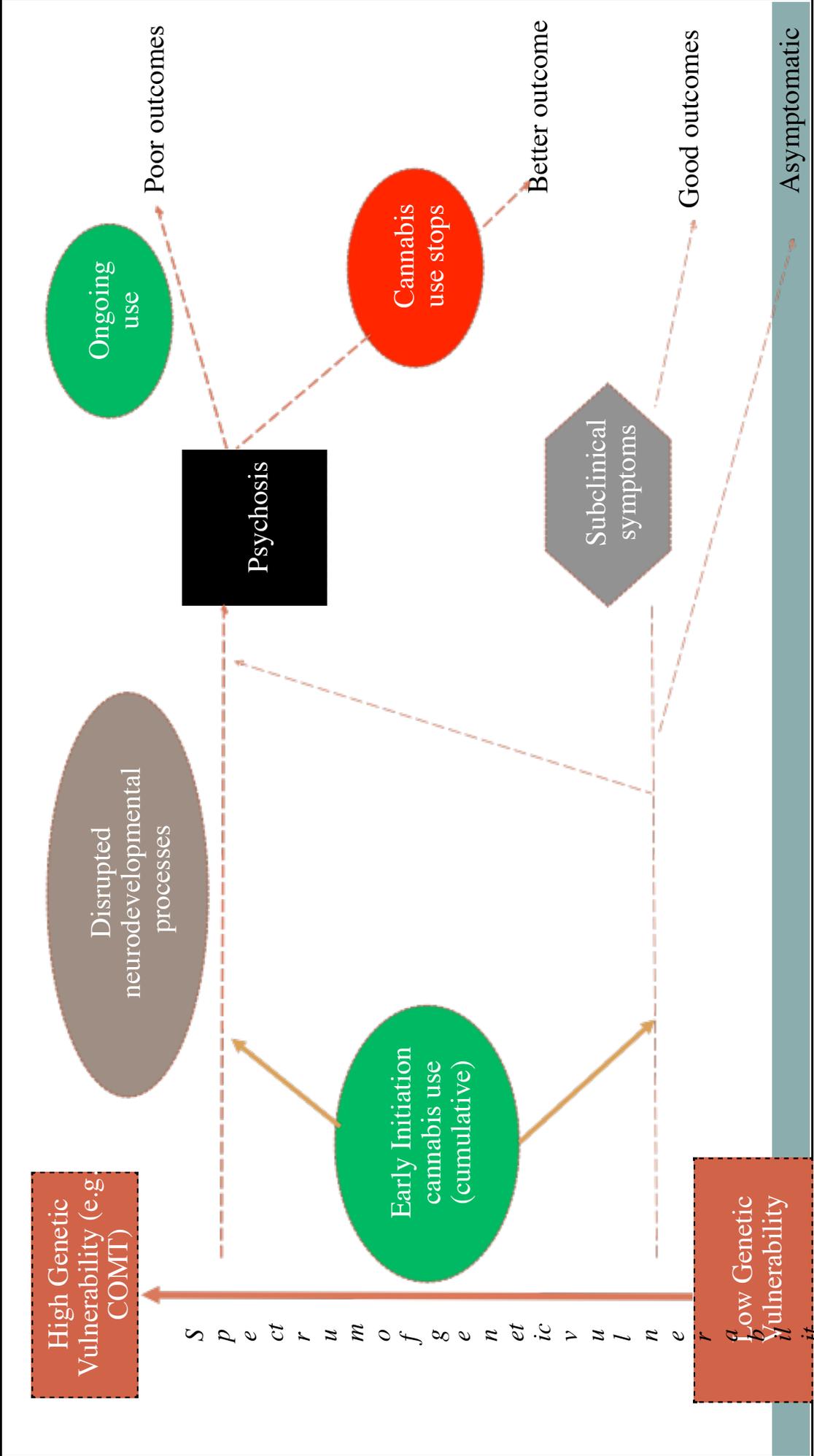




The majority of young adults who use cannabis may not develop adverse mental health outcomes such as psychosis

- this suggests there may be additional factors that render the young adult brain more sensitive to effects of cannabis in those that go on to more negative outcomes
- {there are other outcomes though other than psychosis}

Gene x environment interactions



High Genetic Vulnerability (e.g., COMT)

S p e c t r u m o f g e n e t i c v u l n e r a b i l i t y

Low Genetic Vulnerability

Disrupted neurodevelopmental processes

Psychosis

Ongoing use

Early Initiation cannabis use (cumulative)

Cannabis use stops

Subclinical symptoms

Poor outcomes

Better outcome

Good outcomes

Asymptomatic

Development, Biology, and Health Effects



Dr. Candice E. Crocker, PhD; Nova Scotia Psychosis research Unit,
Department of Psychiatry

Radiology Research, Department of Diagnostic Imaging, NSHA

The problems associated with conducting CB research

Complete cure-all versus completely harmless

“Legalization keeps rolling ahead. But because of years of government roadblocks on research, we don’t know nearly enough about the dangers of marijuana...” (Time special ed, 2017)

There is much we do not know.



Childhood



- Is a time of steady growth
- From age 2 to approx. age 12, the body and all systems in it grow.
- The brain reaches 95% of its final size by the end of childhood

Adolescence



- o Between the ages of 12 and 19, a final growth spurt occurs.
- o The brain grows that final 5%.
- o Final maturation of the connections within the brain begins.
- o Puberty occurs

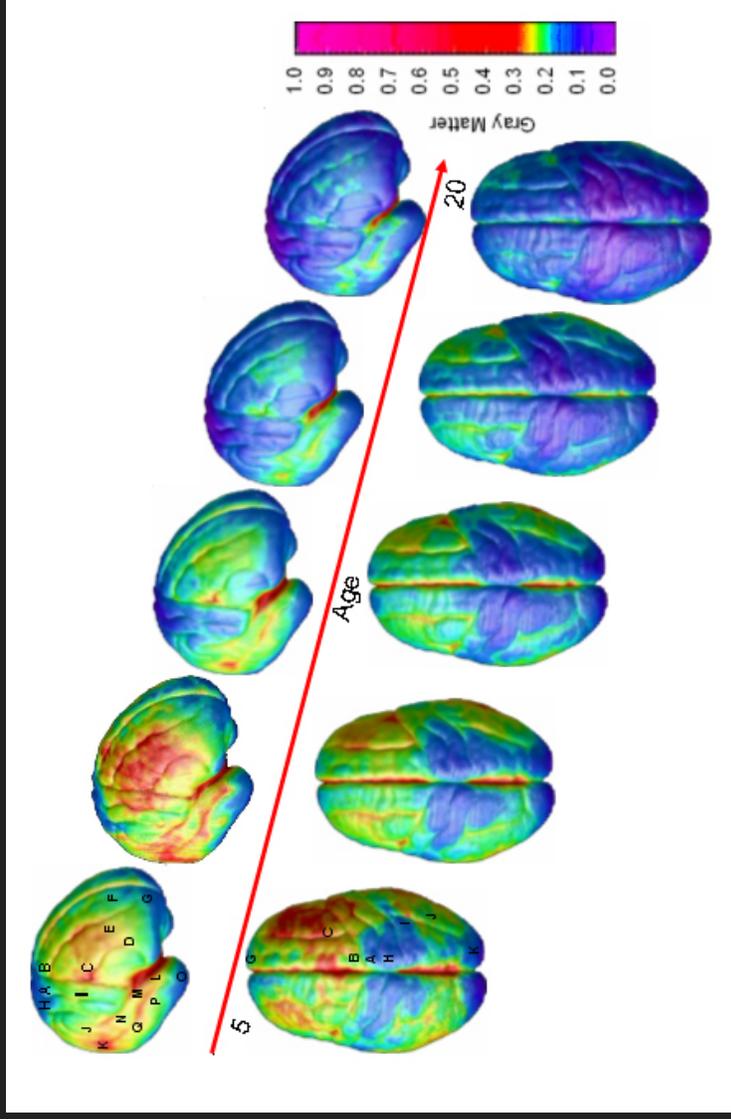
Adulthood

- Growth and development
 - Stop at about age 25
 - Aging process begins after age 25
- The brain continues to regenerate and refresh the myelination of brain tracts.
- So what are the impacts of cannabis use at each stage?



Brain maturation

- Areas performing more basic functions mature earlier; areas for higher-order functions (emotion, self-control) mature later.
- The pre-frontal cortex, which handles reasoning and other "executive" functions, emerged late in evolution, and is among the last to mature.



Adolescent cannabis use and the brain

- In "healthy" users:
 - Learning and memory deficits, reduced attention (may persist following abstinence)
 - Reduced ability to process and regulate emotions
- Structural Imaging:
 - hippocampal and amygdalar volume reductions (some studies indicate volumes inversely related to length of exposure)
 - Deficits in cortical lamination (the cell layers of the cortex)
 - Use before 17 yrs: smaller whole brain and percent cortical grey matter
 - Structural results not consistent in healthy users – Selective Vulnerability?.

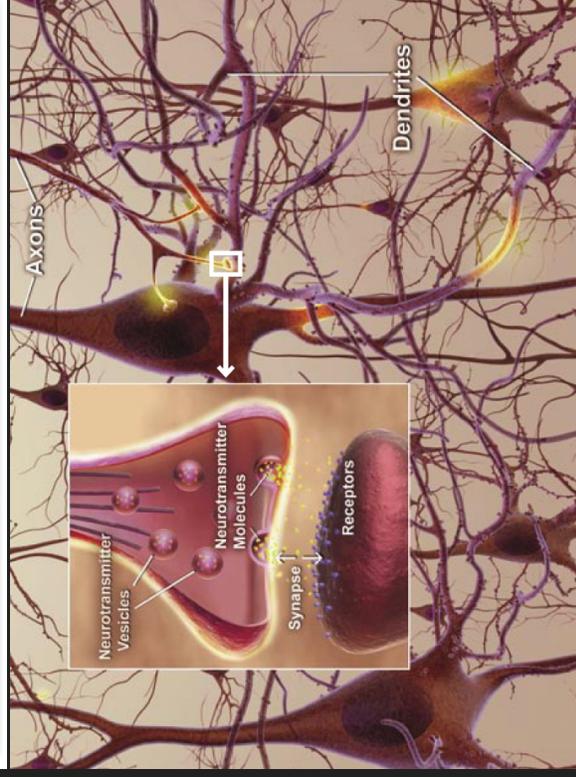
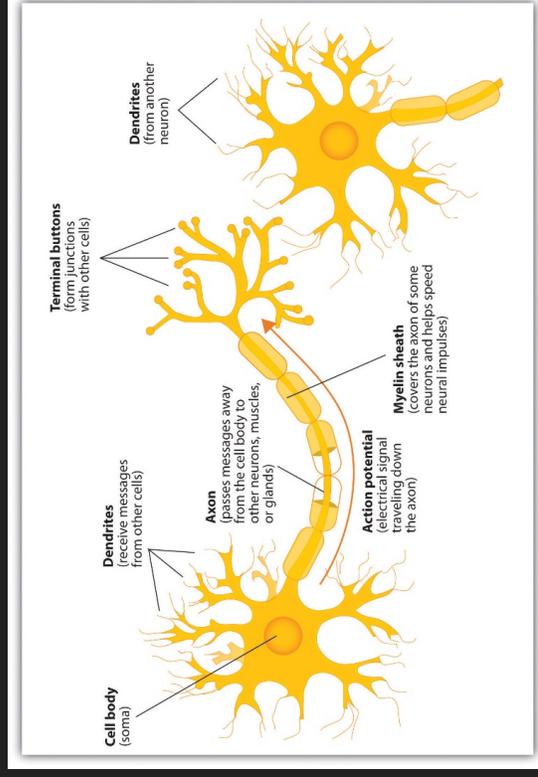
Endocannabinoid System and Brain function

- Modulates both inhibitory and excitatory signaling.
- Signaling affects long and short term synaptic plasticity and is involved in functions such as neural development, motor control and cognition.
 - regulation of cognitive functions via neuronal circuits of the cortex
 - Memory via hippocampal neurons
 - Emotions via neurons of the amygdala
 - Central processing of pain via the periaqueductal grey matter, medulla and spinal trigeminal nucleus

The purpose of eCB in the teenage brain

Warning: Neuroscience ahead

- Endogenous cannabinoids guide the connections within the developing brain
- Are the basic building blocks of communication in the brain.
- The application of extra cannabinoids confuses this system leading to incorrect connections being formed.
- We do not know if this damage is reversible
- This process is no longer critical once the brain is mature.



The key to why CB is bad for teenagers and not so bad for adults

Brain maturation

An almost complete switch in the distribution of CB1 receptors takes place in the brain as we mature.

Reductions in cortical thickness, hippocampal volume and integrity of white matter tracts are all found with use starting in adolescence.

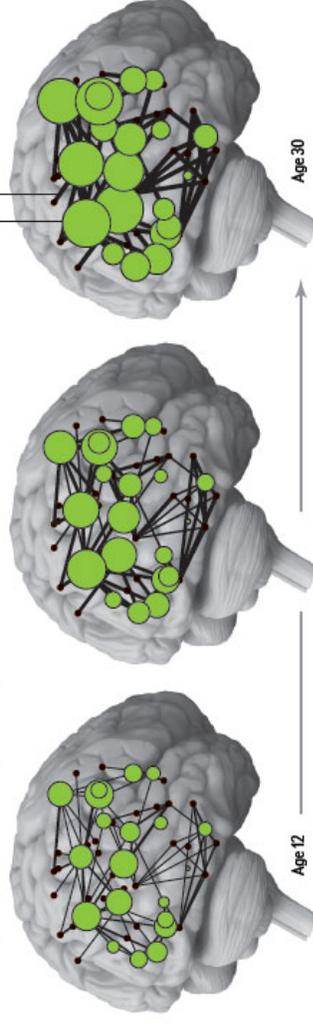
A NEW VIEW

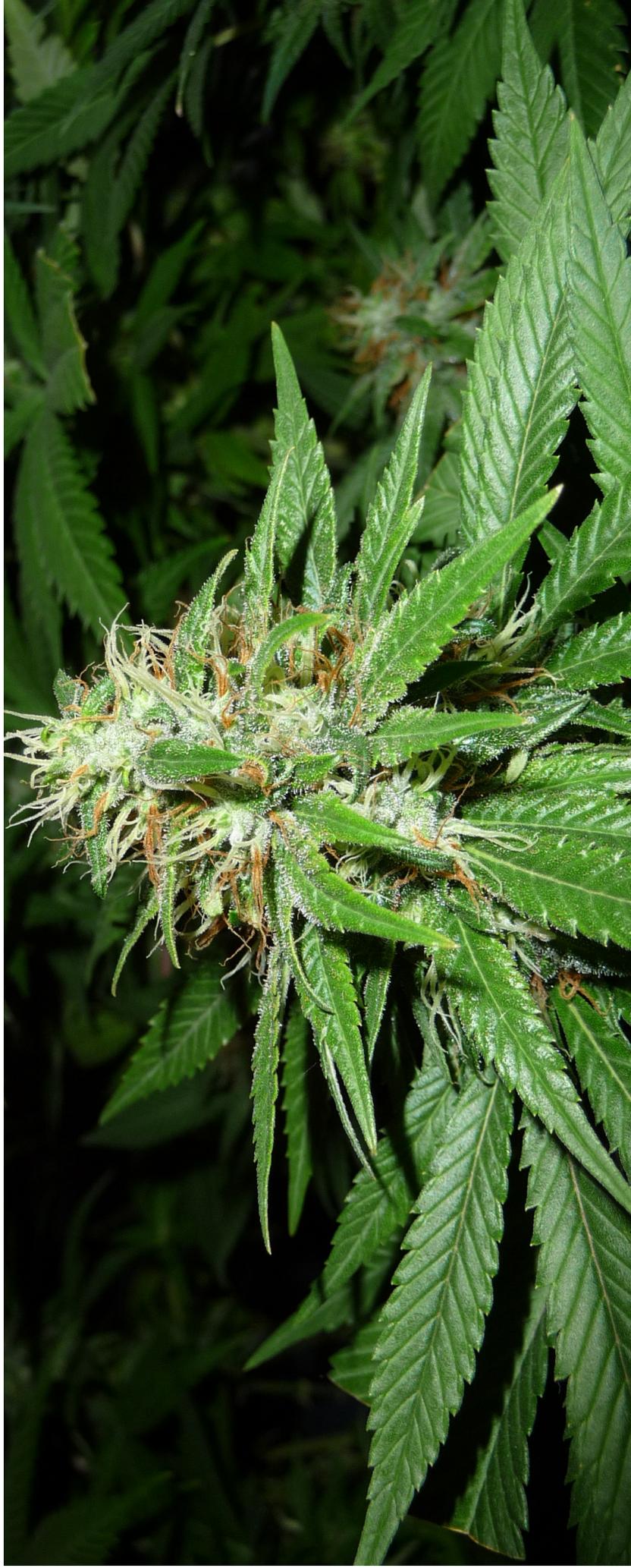
Greater Networking Brings Maturity

The most significant change taking place in an adolescent brain is not the growth of brain regions but the increase in communications among groups of neurons. When an analytical technique called graph theory is applied to data from MRI scans, it shows that from ages 12 to 30, connections between certain brain regions

or neuron groups become stronger (black lines that get thicker). The analysis also shows that certain regions and groups become more widely connected (green circles that get larger). These changes ultimately help the brain to specialize in everything from complex thinking to being socially adept.

Increasing Communications among Brain Regions over Time





So what do we know about Cannabis?

Chemical constituents

- For simplicity, often refer to 4 main cannabinoids in Cannabis
 - Delta-9 THC
 - Cannabidiol (CBD)
 - Cannabinol (CBN)
 - Delta-8 THC



What about the good effects of Cannabis.



- So you hear about the wonders of using cannabis for epilepsy, chronic pain, migraines and multiple sclerosis, are these true?
- Not exactly
- CBD in pill form has shown benefits for some patients as an add on (they still take their AED) for Dravet's syndrome.
- No effect on other epilepsy syndromes has been shown.
- Pain has shown some positive results, works for some not others.
- Does not work in MS trials
- No evidence for improvement of migraine.

No drug is entirely harmless

- If cannabis has effects on human health then like any drug it will have positive effects and negative side effects.

Who will experience the side effects and what the effects are what we can not predict.

This is why we suggest caution.

Regular Heavy use may not be good for adults

- So while an occasional joint may not be any worse than an alcoholic drink for most adults, regular use is not recommended.
- Addiction
- Cognitive Effects (processing speed, memory)
- Cardiovascular
- Respiratory

Cannabis can be addictive

- This is a popular weed myth – *Cannabis is not addictive*.
- Like all drugs that alter one's consciousness CB can be addictive, particularly in females and particularly if taken with alcohol or tobacco.
- Cannabis abuse/dependence rate greater than all other illicit drug/dependence combined

Addictive potential versus Mean harm

- Mean harm scales are what is usually cited by cannabis advocates
- Is measured on a scale developed by McNutt and colleagues in 2007, based on dependence potential, social harm and physical harm.



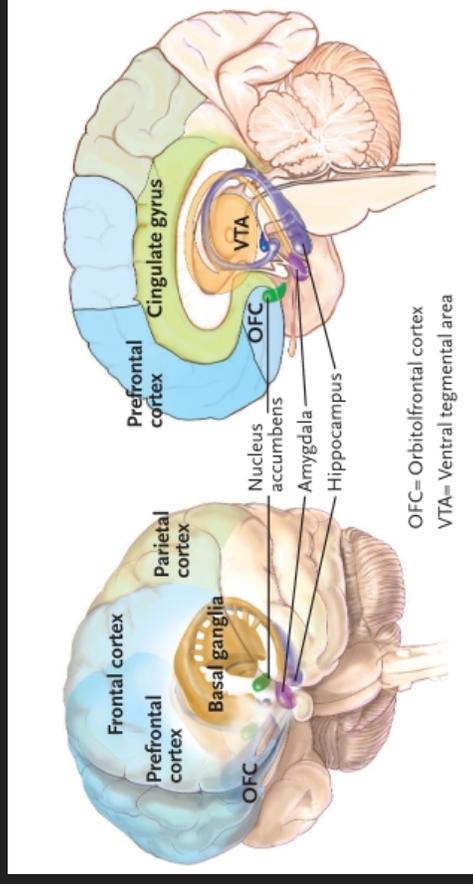
Addictive potential versus Mean harm

- Addictive potential is measured on scales called the Henningfield and Benowitz ratings.
- These work by comparing six common substances and assess their addiction potential.
- Addiction potential is based on five criteria including: withdrawal, reinforcement, tolerance, dependence, and intoxication.

1. Heroin (9)
2. Alcohol (12)
3. Cocaine (15)
4. Nicotine (15)
5. Marijuana (27)
6. Caffeine (27)

Cannabis can be addictive

- Cannabis Use Disorder (the formal name for addiction to cannabis) is more prevalent in regions where cannabis use is legalized.
- Current rates (from drug abuse.gov) suggest 30% of users have some degree of addiction
- Individuals who begin use prior to age 18 are 4-7 times more likely to develop an addiction.



Cannabis and Cognition

- Regular use of cannabis can impair cognitive function.
- Regular cannabis use in adolescence can impair working memory, visual scanning, learning and cognitive flexibility (Lorenzetti et al., 2016).
- So executive functions are impacted (yes those are those planning functions that are just developing in the teenage brain)

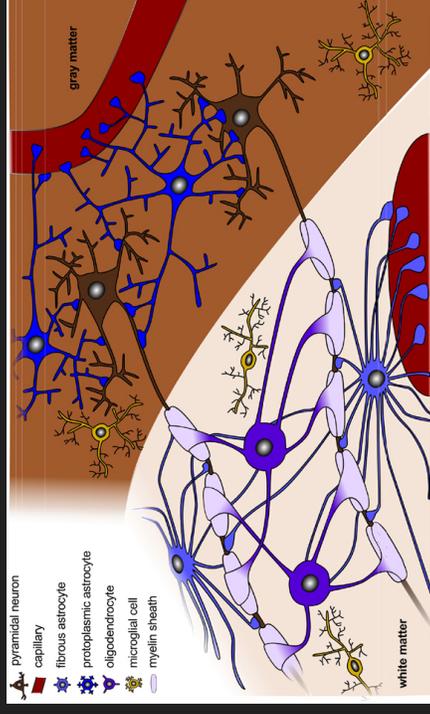


Regular Heavy use may not be good for adults

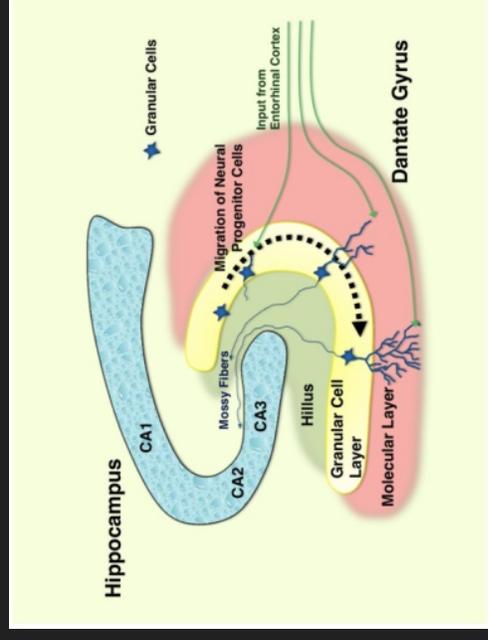
Cognitive Effects (processing speed, memory)

The reason is likely tied to two actions of cannabis. WM damage and failure to support the stem cell niche of the hippocampus.

Adult born neurons from this niche have also been shown to protect against the effects of chronic stress.



Budday 2015, Front. Cell. Neurosci



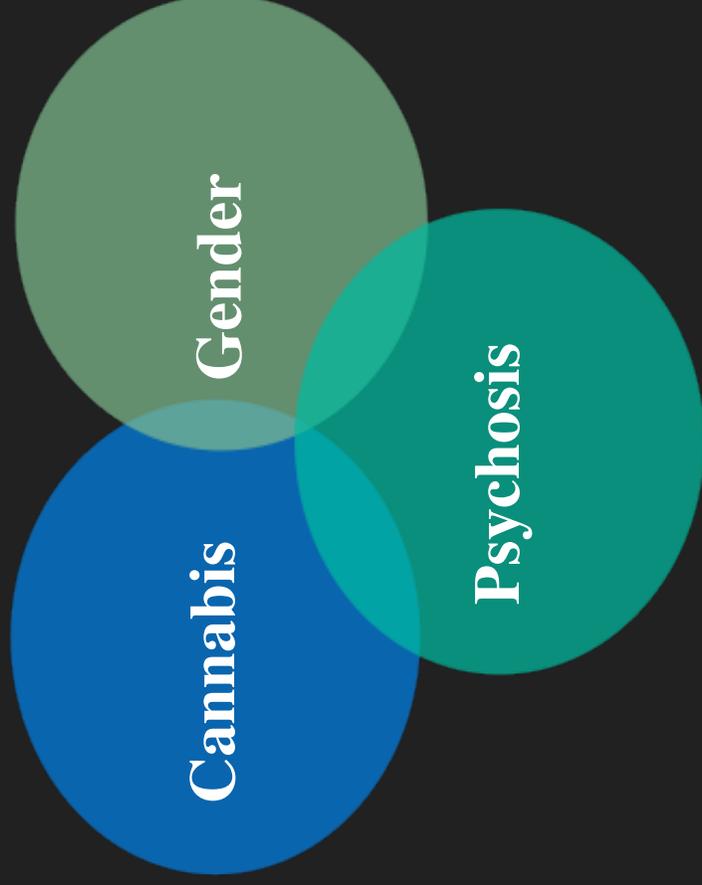
Kino T - Front Physiol (2015).

Who is at risk? And for what?

- Mental health concerns but no way to identify who is at risk.
- Cardiovascular events (stroke) particularly in occasional users over age 50 and male users from 18-21. Not common but do occur.
- Lung health has not been well studied.
 - Considerations if primary route is unfiltered smoke
 - strong evidence for chronic bronchitis
 - some evidence for COPD in heavy users
 - Cancer risk is less clear, most studies on lung function.

Gender interactions

- While less common for women with psychosis to have cannabis use disorder (CUD), early indications are that poorer outcomes may be expected for these individuals even compared to males with psychosis and CUD.
- The reasons behind this are presently unknown.



Telescoping and transition

- Fewer females use but more show addiction.
- Females telescope meaning that they go from first use to regular use faster than males.
- CB may act as a gateway drug. Next choice is most commonly heroin.

Cannabis and Pregnancy

- Use of cannabis as an anti-nausea agent in pregnancy is rising.
- However a recent study examining 279,457 pregnant women found that nausea and vomiting during pregnancy were more likely to occur in women who were using cannabis.
- Another caution, though not extensively studied there is evidence that cannabis use during pregnancy is associated with low birth weight and low birth weight is a known risk factor for developmental delay in children.

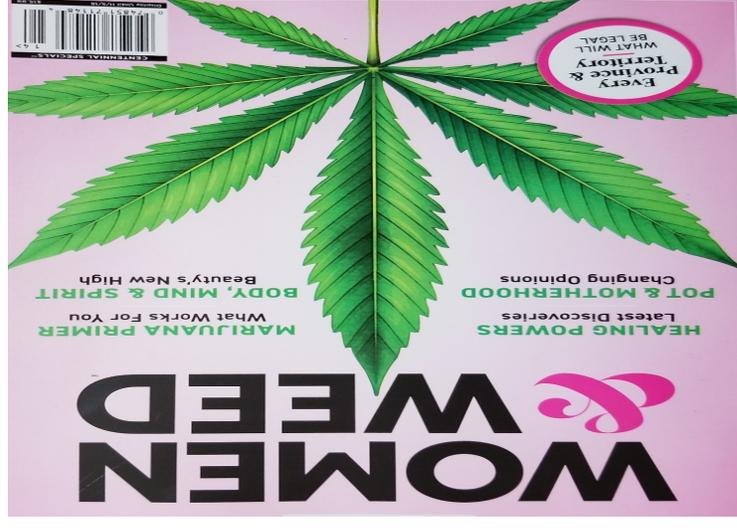
Cannabinoid Hyperemesis Syndrome



- Paradoxical effects of CB on the GI tract
- At low doses, munchies
- At high doses/regular use, Cannabinoid hyperemesis syndrome can occur
- Usually 48 hours of nausea, vomiting and abdominal pain
- Often associated with a learned behavior of hot bathing to reduce the vomiting
- Thought to begin after 3 years of regular use, however there are case reports of CHS after just a few weeks of use.
- Has a prodromal phase can last for months or years with patients developing early morning nausea, a fear of vomiting, and abdominal discomfort

Cannabis considerations for women

- THC and other cannabinoids are lipid soluble
- This means that women will retain and release these compounds over a longer period of time.
- Women metabolize drugs more slowly than men.
- Intoxication can last longer at a lower dose.
- Women are a market growth area



The risk timeline with regular use





So what do we do with all this information?

Our Role in Knowledge Translation?



- Evidence-based Position statements/papers
 - E.g. CMA, CPA and other organizations
- Community presentations/panels
 - E.g. Canadian Center on Substance Abuse (CCSA), us here today!
- Educating parents and community ‘gatekeepers’
 - E.g. Drug Free Canada Kids (drugfreekidscanada.org)
- Educating youth and young adults
 - “WeedMyths” campaign in NS (weedmyths.ca)
 - Cannabis and Psychosis (CCEIP, endorsed by SSC and EPION) (cannabisandpsychosis.ca)
 - Youth friendly information for schools (teenmentalhealth.org)

The scientific, clinical and school/university/college community has an important role in public/youth awareness and education

Our Role in Knowledge Translation and Mental Health Advocacy? *Position Statements*



Canadian Psychiatric Association
Dedicated to quality care
Association des psychiatres du Canada
Dévouée aux soins de qualité

POSITION STATEMENT



CAPL
Canadian Association of
Psychiatric Legal Medicine
Association canadienne de
Médecine Psychiatrique et
Juridique



cagp | acgp
Canadian Association of
Geriatric Psychiatry
Association canadienne de
Gériatrie Psychiatrique



Implications of Cannabis Legalization on Youth and Young Adults

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*A position statement developed by the Canadian Psychiatric Association's Research Committee
and approved by the CPA's Board of Directors on February 17, 2017.*

Canada's Lower-Risk Cannabis Use Guidelines (LRCUG)



Recommendations

- Cannabis use has health risks best avoided by abstaining
- **Delay taking up cannabis use until later in life**
- Limit and reduce how often you use cannabis
- If you smoke cannabis, avoid harmful smoking practices
- Identify and choose lower-risk cannabis products
- Don't use and drive, or operate other machinery
- Don't use synthetic cannabinoids
- Avoid cannabis use altogether if you are at risk for mental health problems or are pregnant
- Avoid smoking burnt cannabis—choose safer ways of using
- Avoid combining these risks

Our Role in Knowledge Translation and Mental Health Advocacy? **Educating parents**

- Ensuring that resources and information are known to parents/families



Educating youth: cannabisandpsychosis.ca

Project of the SSC
and CCEIP, with
funding from Health
Canada and CCSA



HOME

Q/A

EXPERIENCE

FACTS

ABOUT/CONTACT

RESOURCES

FRANÇAIS



Cannabis & Psychosis

EXPLORE THE LINK

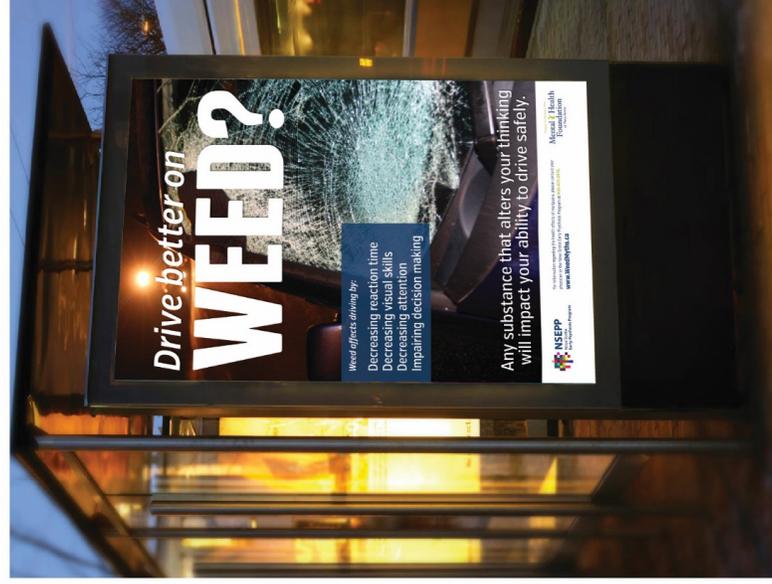


Our Role in Knowledge Translation and Mental Health Advocacy?

Educating Youth (in general)

- WeedMyths public awareness and education campaign
 - Funded by the MHFNS, NSEPP, NS DOHW
 - Creative team working with focus groups of youth and young adults
 - “Don’t ‘tell’ us what not to do”; no print, Instagram and YouTube with short ‘graphic’ videos
 - Campaign included bus shelter ads, Instagram and YouTube videos, website (WeedMyths.ca); recently expanded to include hockey rink and billboard
 - Focused on 2 myths (due to budget):
 - Drive better on weed
 - Weed is harmless
- 2 Runs of this campaign

OUTDOOR CAMPAIGN BUS SHELTER POSTERS





Thank you!

Questions? Comments?

