Effects of Adolescent Cannabinoid and Nicotine Exposure

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Disclosures

I have no competing interests to disclose.
Tobacco and Nicotine Addiction

- 6 million premature deaths each year worldwide
- 600,000 deaths second-hand exposure in non-smokers
- Quitting success rate <10% after 1 year
- Main psychoactive component in tobacco: Nicotine
E-Cigarettes and Adolescence

F.D.A. Accuses Juul and Altria of Backing Off Plan to Stop Youth Vaping

Altria's deal to purchase 35 percent of Juul Labs gives the fast-growing e-cigarette start-up access to the tobacco giant's shelf space in 230,000 retailers. Scott McIntyre for The New York Times

Jan 4, 2019
Prevalence of Cannabis Use in Electronic Cigarettes Among US Youth

Katrina F. Trivers, PhD, MSPH\textsuperscript{1}; Elyse Phillips, MPH\textsuperscript{1}; Andrea S. Gentzke, PhD, MS\textsuperscript{1}; \textit{et al.}

High Comorbidity of Nicotine and Cannabis Co-use

Chadwick et al., Frontiers in Psychiatry, 2013
20,679 Physicians say LUCKIES are less irritating

I too prefer LUCKIES because...

Toasting removes dangerous irritants that cause throat irritation and coughing

“It’s toasted”

Your Throat Protection — against irritation — against cough.

SMOKE IN STYLE
With blu Electronic Cigarettes

Freedom never goes out of fashion. Control when and where you want to smoke with blu electronic cigarettes. blu produces no tobacco smoke and no ash, only vapor, making it the ultimate accessory and the smarter alternative to regular cigarettes. Step out in style with blu.

blucigs.com

18+ ID required. blu e-cigs are not a smoking cessation product and have not been evaluated by the Food and Drug Administration, nor are they intended to treat, prevent or cure any disease or condition.
CAUSES CANCER  CURES CANCER

CONTAINS:
POISONOUS CHEMICALS
REGULATED BY THE FDA
WE DEMAND ANSWERS NOW!

CONTAINS:
HEALING NATURAL MEDICINE
NOT APPROVED BY THE FDA
LEGALIZE THE CURE!
Cannabis Exposure During Development

A natural and safe herb? Are there limitations to this characterization?
Many pregnant women don't think cannabis is harmful, UBC study finds

'Some people don't consider cannabis to be a drug,' lead author says

CBC News · Posted: Jan 23, 2019 7:04 AM PT | Last Updated: January 23

The Society of Obstetricians and Gynaecologists of Canada says just because pot is legal doesn't mean its use is safe during pregnancy or when breastfeeding.
James Stanton

If you read this article carefully, it is very careful to skirt around an inconvenient truth in the narrative - all research on this subject says clearly that no causal link has been established between marijuana and any of the correlations they found with health issues. For those of you who don't 'science' that means there is no scientific evidence whatsoever that marijuana causes harm to the fetus during pregnancy. Many of the problems that are correlated are also correlated with many other things, and the most likely causal factor is actually poverty/socioeconomic status if you look at the demographics using cannabis during pregnancy. That said, there's also no solid evidence that it's harmless either... There is of course the fact that it is non-toxic in every other context, human or animal, from which we could draw our conclusions... That would be about as scientific as just assuming that it's bad without causal evidence...

« less

22 hours ago

Rob Grace

@James Stanton

So you are saying we should wait a few years and see what happens then if something does sue the heck out of the Government for not properly informing us. Good plan unless something does happen and you just happen to be one of those it happens to.

22 hours ago

is safe during pregnancy or when breastfeeding.
**Increased**
- Anxiety
- Synapse formation
- Glutamate signaling in prefrontal cortex
- Dopamine D2 receptor levels in brain

**Decreased**
- Hyperactivity
- Short-term memory
- Synaptic plasticity
- Gene expression
- Opioid receptor abundance in prefrontal cortex
- Neuroendocrine signals in the hypothalamus

**Altered**
- Birth weight
- Verbal reasoning scores
- Aggression (females)
- Anxiety and depression
- Impulsivity and inattention
- Hyperactivity

**NEONATE**
- Birth weight

**EARLY DEVELOPMENT**
- Verbal reasoning scores
- Short-term memory
- Aggression (females)
- Anxiety and depression
- Impulsivity and inattention
- Hyperactivity

**ADOLESCENCE**
- Anxiety
- Memory consolidation
- Socialization
- Depression
- Abstract reasoning
- Delinquency, antisocial behavior

**ADULTHOOD**
- Socialization
- Anxiety
- Opioid-seeking
- Short-term memory
- Synaptic plasticity
- Gene expression
- Opioid receptor abundance in prefrontal cortex
- Neuroendocrine signals in the hypothalamus

www.the-scientist.com
Drugs and the Brain

How do cannabinoids and nicotine act to modulate function of the brain?
THC and CBD act on cannabinoid receptors in the brain.
Nicotine acts on nicotinic receptors in the brain.

Jasinska et al. 2013 Neuropharmacology
Research Question

Is adolescence a sensitive period for the detrimental effects of drug exposure?
Dynamic changes in endogenous cannabinoid signaling during adolescence

Chadwick et al., Frontiers in Psychiatry, 2013
Human and rodent development

Yuan et al., *J Physiology*, 2015
Adolescent Drug Exposure Paradigm

Control
NIC – Nicotine
WIN – Cannabinoid receptor agonist
NIC/WIN – Nicotine and WIN co-exposure

Yuan et al., J Physiology, 2015
2019 North American Cannabis Summit
Cannabinoid exposure in females, but not male, decreases body weight in adolescence.
Research Question

Does adolescent nicotine and/or cannabinoid exposure alter the ability to learn an operant task in adulthood?
Adolescent drug exposure does not alter operant learning for food reward in males
Adolescent drug exposure does not alter operant learning for food reward in females.
Enhanced cognitive flexibility in the reversal task in cannabinoid-exposed males
Research Question

Does adolescent nicotine and/or cannabinoid exposure alter affective behaviors?
Decreased anxiety-associated behaviors in males, but not females, during adulthood
Increased sucrose reward exhibited in cannabinoid exposed males, and an opposing effect in females
Group differences not found in a measure of depression
Research Question

Do the reward-related effects predispose groups to altered nicotine reinforcement in adulthood?
Increased nicotine intake found in cannabinoid-exposed males, whereas decreased intake found in females.
In males, long-lasting effects of adolescent cannabinoid exposure lead to decreased anxiety-like behaviors, increased reward-related cognitive flexibility, and increased nicotine intake during adulthood.

Female mice exhibited differential effects than males, with cannabinoid treatment leading to decreased weight gain during adolescence, and decreased natural reward consumption and nicotine intake during adulthood.

Together, these data provide evidence of long-term effects of cannabinoid exposure on later affective, cognitive and nicotine taking behaviors in adulthood.
Thanks to...

Fowler Lab
Valeria Lallai, PhD
Yasmine Sherafat
Angeline Eugene
Yen-Chu (Andrew) Chen
JP Fowler
Amina Ahmed
Andres Staben Ramirez
Malia Bautista
Eashan Kotha
Adriana Hernandez
Vasquez
Miguel Ruiz Romo
Rachel Meek