

Addiction as a Developmental Disorder: Risk, Trajectory, and Neurobiology

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Disclosures

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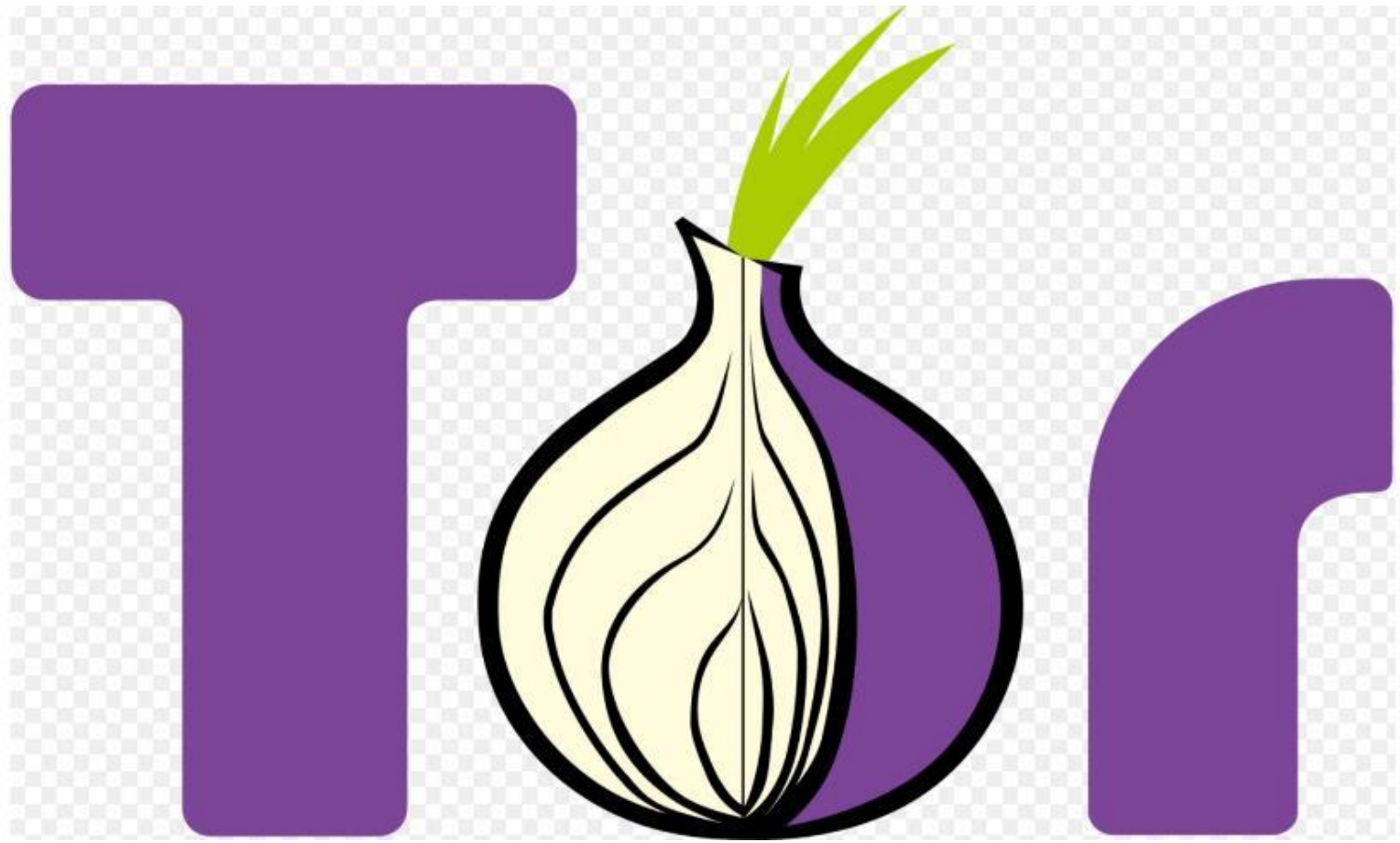
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Objectives

- Identify concerning national trends for youth
- Learn about the developmental and psychological underpinnings of addiction
- Discuss ways high risk youth can be identified relative to substance use disorders
- Discuss the importance of prevention and early intervention

Benzos and Bitcoin





Drugs 486

- Cannabis 82
- Dissociatives 18
- Ecstasy 64
- Opioids 8
- Other 15
- Precursors 13
- Prescription 92
- Psychedelics 83
- Stimulants 38

Apparel 77

Art 0

Biotic materials 0

Books 17

Collectibles 0

Computer equipment 4

Custom Orders 1

Digital goods 3

Drug paraphernalia 35

Electronics 3

Erotica 0

Forgeries 18

Hardware 0

Herbs & Supplements 0

Jewelry 4




Lab Supplies 1

Lotteries & games 11

Medical 0

Money 4

browsing drugs

item	
	0,7g Hydroponically Grown Crystal Cloud (LIMITED TIME OFFER!!!)
	7g (1/4oz) P.Cubensis Powder
	Methadone hydrochloride - 250mg pure (min 90%) crystalline powder

Accessing Drugs Through Normal Web

- Kratom
- Cava
- Dextromethorphan
- “Peptides”
- Tianzepine (“Gas station heroin”)

Dark Web Drugs

- Cryptocurrency is the initial catalyst
- Electronic payment platforms (CashApp)
- Cheap prices







Why the Concern for Youth

- Benzos are incredibly cheap (\$2-5 a “bar”)
 - Blackouts
 - Seizures
 - Delirium
-
- Many illicit drugs are cut with Fentanyl
 - Powdered Fentanyl can be used in many ways (spray bottle)

SYNTHETIC CANNABINOIDS (K2/SPICE)

UNPREDICTABLE DANGER

K2/SPICE IS **NOT** MARIJUANA

It's often called *synthetic marijuana* or *fake weed* because some of its chemicals are like those in marijuana. The effects can be unpredictable and in some cases, severe or even life-threatening.



Shredded, dried
plant material

+



Man-made
chemicals

=



A "natural" drug?
Not even close.



For more information, visit:
drugabuse.gov/publications/drugfacts/synthetic-cannabinoids



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brodifacoum

noun | bro·di·fa·coum | \,brō-,dī-'fa-,küm\

⚡ **TRENDING NOW:** [abhorrent](#) [embolization](#) [oleaginous](#) [pansexual](#) **ALL >**



Medical Definition of BRODIFACOUM

: a poisonous anticoagulant compound $C_{31}H_{23}BrO_3$ that is a derivative of [coumarin](#) and is used as a rodenticide and pesticide



J. Med. Chem. 2012 Sep 27;55(18):7967-77. Epub 2012 Sep 11.

7-Alkyl-3-benzylcoumarins: a versatile scaffold for the development of potent and selective cannabinoid receptor agonists and antagonists.

Rempel V¹, Volz N, Hinz S, Karcz T, Meliciani I, Nieger M, Wenzel W, Bräse S, Müller CE.

⊕ Author information

Abstract

A series of 7-alkyl-3-benzylcoumarins was designed, synthesized, and tested at cannabinoid CB(1) and CB(2) receptors in radioligand binding and cAMP accumulation studies. 7-Alkyl-3-benzylcoumarins were found to constitute a versatile scaffold for obtaining potent CB receptor ligands with high potency at either CB(1) or CB(2) and a broad spectrum of efficacies. Fine-tuning of compound properties was achieved by small modifications of the substitution pattern. The most potent compounds of the present series include 5-methoxy-3-(2-methylbenzyl)-7-pentyl-2H-chromen-2-one (19a, PSB-SB-1201), a selective CB(1) antagonist (K(i) CB(1) 0.022 μM), 5-methoxy-3-(2-methoxybenzyl)-7-pentyl-2H-chromen-2-one (21a, PSB-SB-1202), a dual CB(1)/CB(2) agonist (CB(1)K(i) 0.032 μM, EC(50) 0.056 μM; CB(2)K(i) 0.049 μM, EC(50) 0.014 μM), 5-hydroxy-3-(2-hydroxybenzyl)-7-(2-methyloct-2-yl)-2H-chromen-2-one (25b, PSB-SB-1203), a dual CB(1)/CB(2) ligand that blocks CB(1) but activates CB(2) receptors (CB(1)K(i) 0.244 μM; CB(2)K(i) 0.210 μM, EC(50) 0.054 μM), and 7-(1-butylcyclopentyl)-5-hydroxy-3-(2-hydroxybenzyl)-2H-chromen-2-one (27b, PSB-SB-1204), a selective CB(2) receptor agonist (CB(1)K(i) 1.59 μM; CB(2)K(i) 0.068 μM, EC(50) 0.048 μM).

PMID: 22916707 DOI: [10.1021/jm3008213](https://doi.org/10.1021/jm3008213)

[Indexed for MEDLINE]





JULY 19, 2018

News

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- ▶ The List: IHPI Top Policy Insights of 2017

Alcohol-related cirrhosis deaths skyrocket in young adults

MICHIGAN MEDICINE

Deaths from cirrhosis rose in all but one state between 1999-2016, with increases seen most often among young adults, a new study shows.

The deaths linked to the end stages of liver damage jumped by 65 percent with alcohol a major cause, adults age 25-34 the biggest victims and fatalities highest among whites, American Indians and Hispanics.

Liver specialist [Elliot B. Tapper, M.D.](#), says he's witnessed the disturbing shift in demographics among the patients with liver failure he treats at [Michigan Medicine](#). National data collected by Tapper and study co-author [Neehar Parikh, M.D., M.S.](#), confirms that in communities across the country more young people are drinking themselves to death.

The data [published in the journal BMJ](#) shows adults age 25-34 experienced the highest average annual increase in [cirrhosis](#) deaths -- about 10.5 percent each year. The rise was driven entirely by alcohol-related liver disease, the authors say.



FDA warns about 'gas station heroin'

One brand recalled products in 2024 after consumers died



Fentanyl

- In as much as 85% of all supply of illicit drug products
- Xylazine positive overdoses increased 1,127% in the South from 2020-2021
- Many analogues detected in OK (acetyl-fentanyl, para-flourofentanyl)
- Opioid overdoses decreased last year for first time since pandemic; meth overdoses rose



What is addiction?

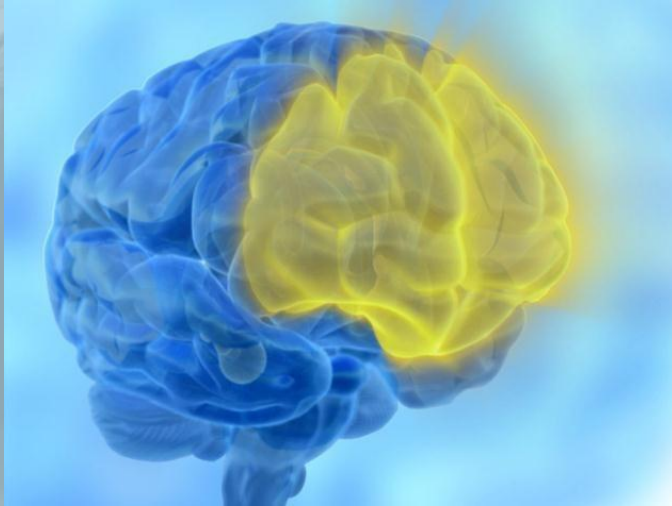


Neurodevelopmental Disorder

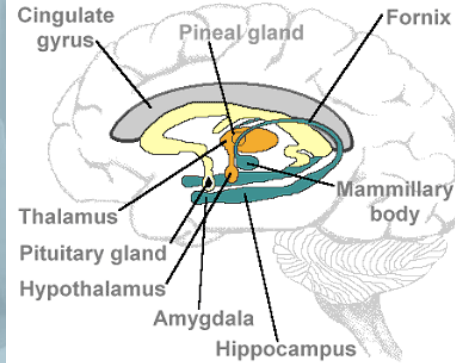


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Two Control Centers



Limbic System



The Limbic System is a complex connection of brain regions deep within the brain underneath the temporal lobes. It includes the Hippocampus, Fornix, Thalamus, Hypothalamus, Amygdala, Olfactory cortex and Cingulate Gyrus. Generally speaking, the limbic system is considered our primitive brain and is responsible for things like emotions, instincts/basic drives (i.e., sex, hunger..), motivation, mood, pleasure/pain, smell and memory. Lesions in the Limbic System can result in voracious appetite, increased (often perverse) sexual activity, and docility (including loss of normal fear and anger responses).



SO...

- Wisdom vs Intelligence
- Teens cannot override emotional impulses consistently
- PROBLEMS?



A blue-tinted photograph of a group of students walking down a wide staircase in a school hallway. The students are in motion, and the image is slightly blurred, giving a sense of activity. The text is overlaid on the left side of the image.

Our View of Addiction Doesn't Match the Science



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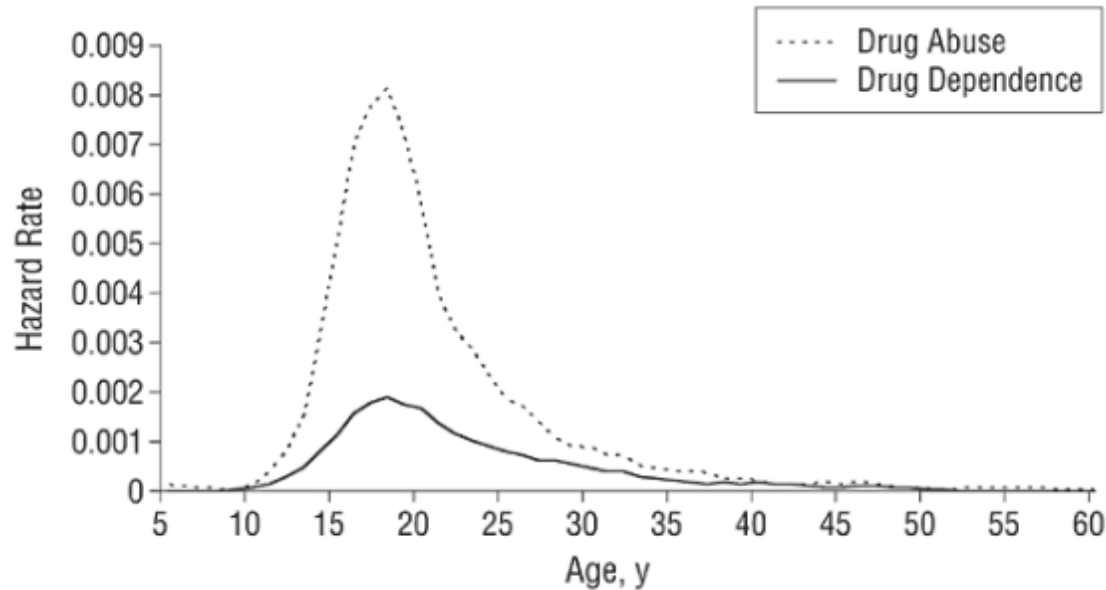


Addiction is a Developmental Disorder

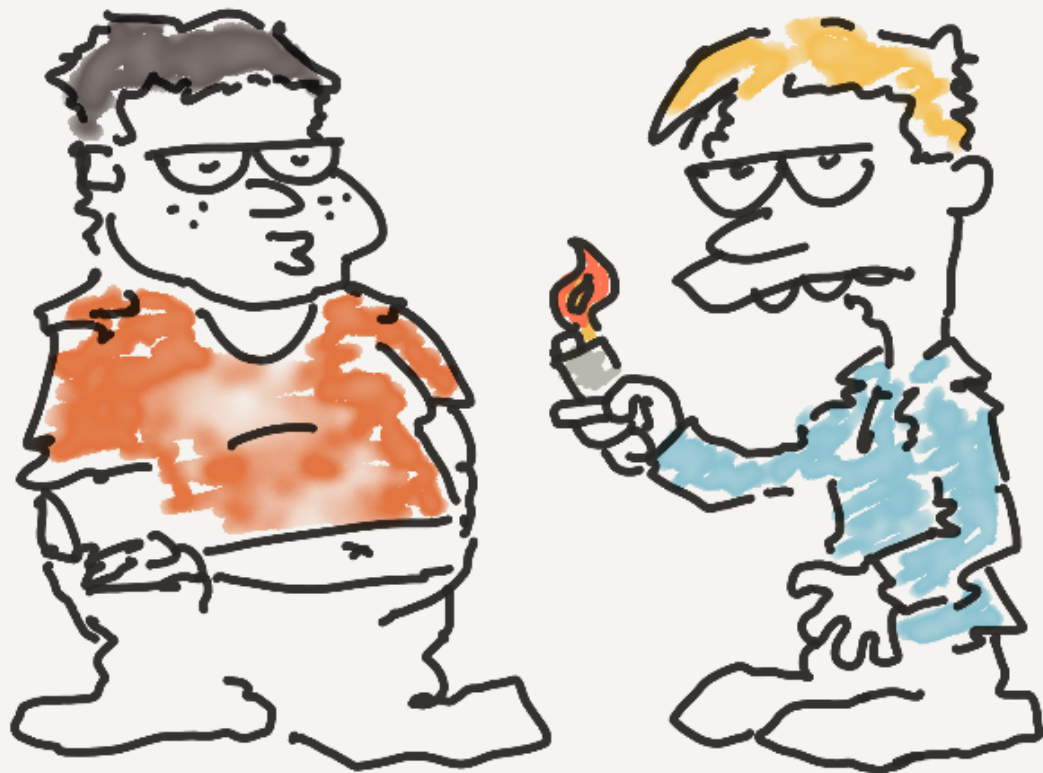


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Addiction is a Developmental Disorder



2 Brothers



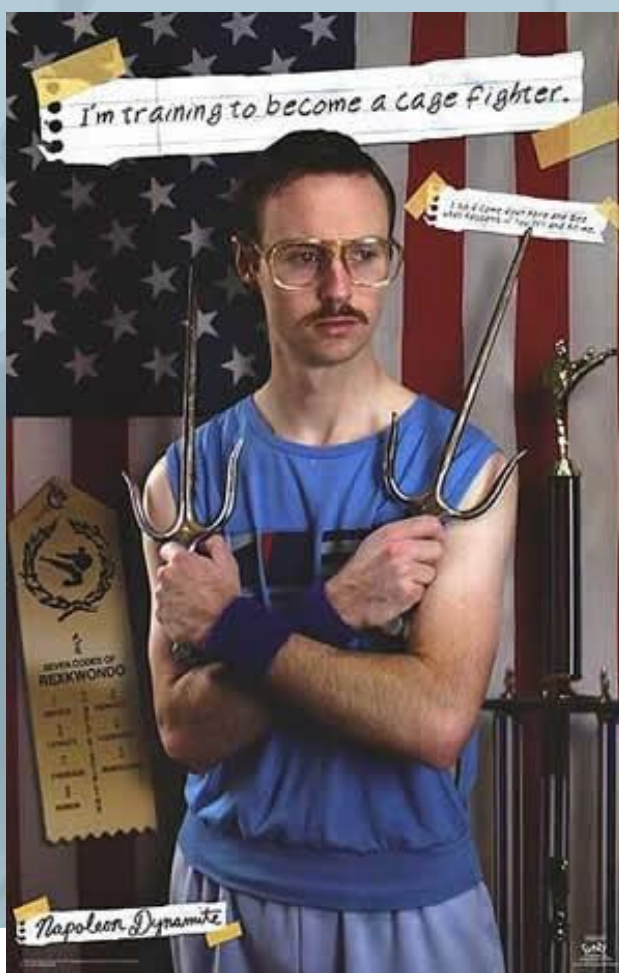


Overweight
Family History
Poor Diet
⇒ intervention



Family history
ADHD
Early Behavior
issues
Negative Peers
➡ only
suspension





- # AT RISK YOUTH ARE DIFFERENT

High Risk Youth are Different

The Marshmallow test





Anticipatory Reward

Anticipatory Reward

Addiction is neurophysiological and from behavioral conditioning

At risk kids feel a strong pull towards conditioned rewards (they blow through homework, chores, to get to an event where they can use)

Get triggered and conditioned and life begins to take a back seat as they chase the reward

Lie more, cover up more, live a “double life”



Delay Discounting



Delay Discounting

- If you increase the delay for a reward your mind tends to discount it more (e.g., \$10 today or \$20 a day later...two, three, days later?)
- At risk youth have a shorter horizon for reward because of how powerfully they're conditioned
- Great difficulty delaying gratification



Delay Discounting

- Not only does the value of reward decrease more quickly over time but so are consequences discounted more rapidly for at risk youth
- Fail a test: “Never again!”; In a few days, rationalize, “maybe it wasn’t that bad”
- High risk cohorts have a hard time hardwiring consequences; their memory stays but the emotional sting does not; they repeat their mistakes

So What Are the Risk Factors?

Individual

- Early initiation
- Behavior problems
- Poor emotional regulation
- Poor grades
- Too much work
- Attitudes
- Pseudomaturity



At Risk Teens Are...

- Less daunted by consequences
- Struggle to hardwire lessons from consequences
- Have a harder time delaying gratification
- Tend to be consequential decision makers
- Are more avoidant when immediate reward is absent
- Much more fatalistic

Familial Risk Factors

- Genetics
- Parent behaviors
- Parenting tactics
- Parent/Child relationships

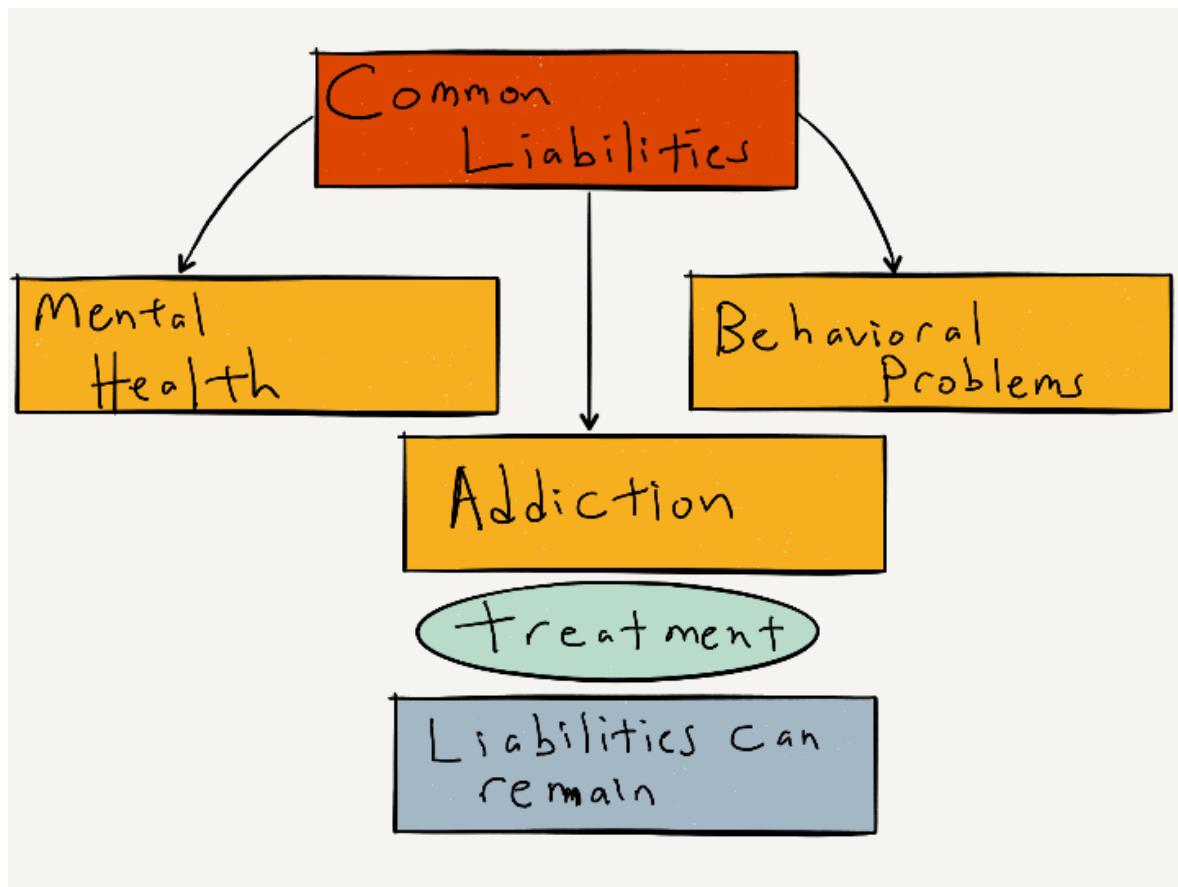
Environmental/Social

- Environmental/Social
 - Using friends
 - Shared attitudes
 - Popularity?
 - Adversity/Trauma



Common Liability Theory

- Shared liabilities change the risk for addiction over development
- i.e. Genetics, Obesity



Drug and Alcohol Dependence

Author Manuscript

HHS Public Access

Index of the Transmissible Common Liability to Addiction: Heritability and Prospective Associations with Substance Abuse and Related Outcomes

Brian M. Hicks, William G. Iacono, and Matt McGue



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Does the Transmissible Liability Index (TLI) assessed in late childhood predict suicidal symptoms at young adulthood?

Cornelius JR¹, Kirisci L, Reynolds M, Vanyukov M, Tarter R.

Author information

Abstract

OBJECTIVE: Our previous work demonstrated that the Transmissible Liability Index (TLI), an instrument designed as an index of liability for substance use disorder (SUD), is associated with risk of substance use disorder. This longitudinal study assessed whether TLI measured in 10-12-year-olds (late childhood) predicts suicidal behavior from age 12-14 (preadolescence) to age 25 (young adulthood). We hypothesized that TLI would predict number and severity of suicide attempts.

METHODS: Subjects were sons of men who had lifetime history of SUD (n = 250), called the High Average Risk (HAR) group, and sons of men with no lifetime history of a SUD (n = 250), called the Low Average Risk (LAR) group. The TLI was delineated at baseline (age 10-12), and age-specific versions were administered at 12-14, 16, 19, 22, and 25 years of age.

RESULTS: TLI was significantly associated with number and severity of lifetime suicide attempts.

CONCLUSIONS: These findings confirm the hypothesis that TLI assessed at late childhood is a predictor of frequency and severity of suicidal behavior from preadolescence to young adulthood.

Addiction is About People, Not Drugs





Think Cohort and Culture not Vice

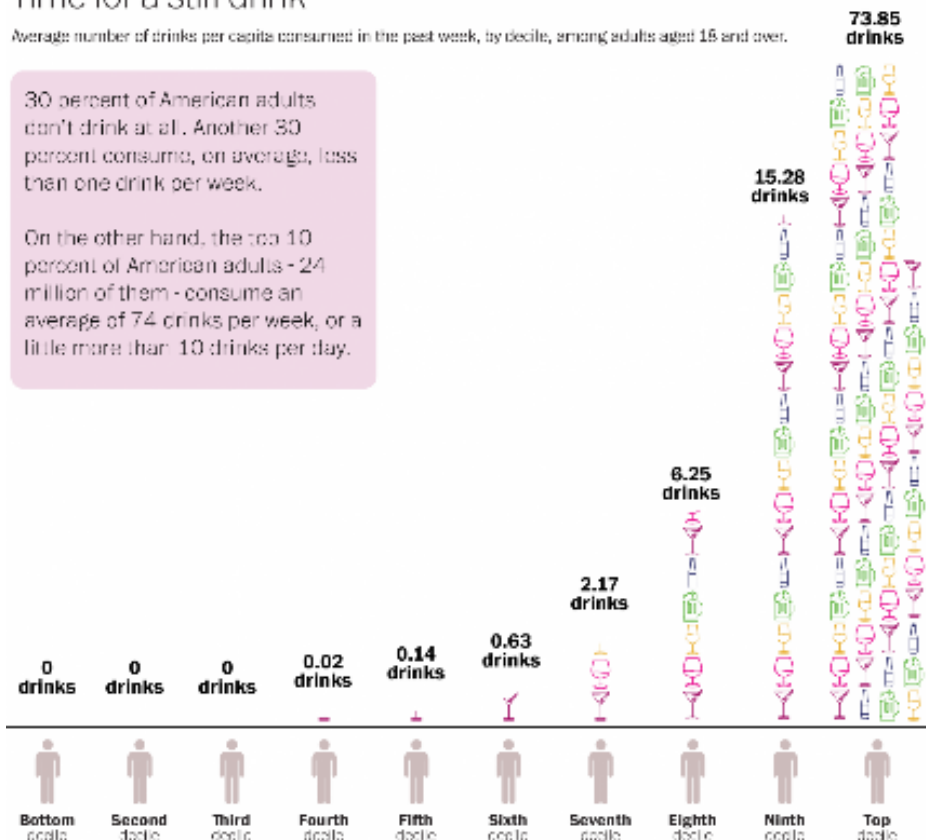
- PARETO'S PRINCIPLE
- 80/20
- 10% of people consume more than half of the alcohol in the country

Time for a stiff drink

Average number of drinks per capita consumed in the past week, by decile, among adults aged 18 and over.

30 percent of American adults don't drink at all. Another 30 percent consume, on average, less than one drink per week.

On the other hand, the top 10 percent of American adults - 24 million of them - consume an average of 74 drinks per week, or a little more than 10 drinks per day.



WASH. POST/COM/WONK/BLOG

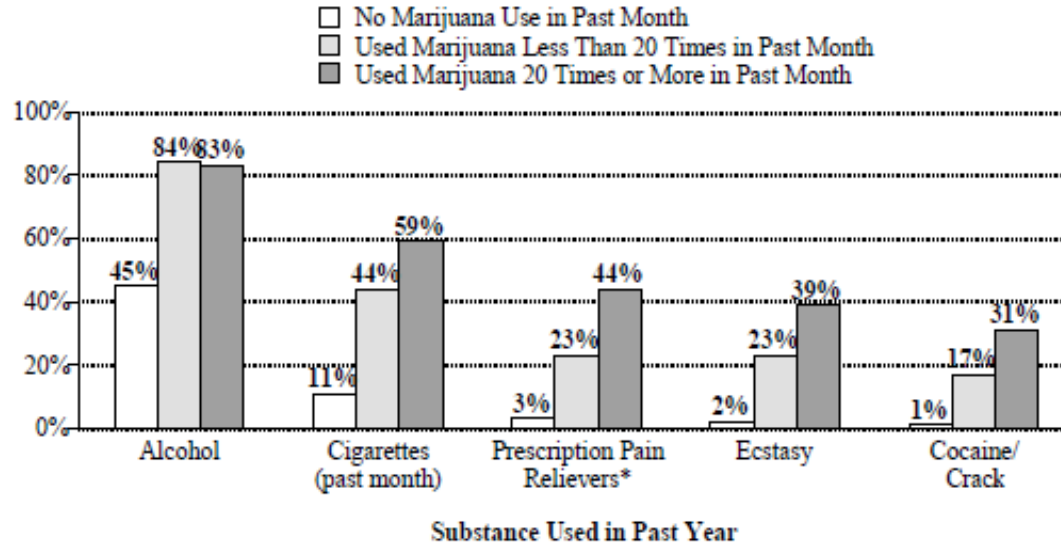
Source: "Paying the Tab," by Paul A. J. Davis



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Marijuana is "Better" Than

Percentage of U.S. High School Students Reporting Past Year Substance Use,
by Past Month Marijuana Use, 2011



Basic Concepts

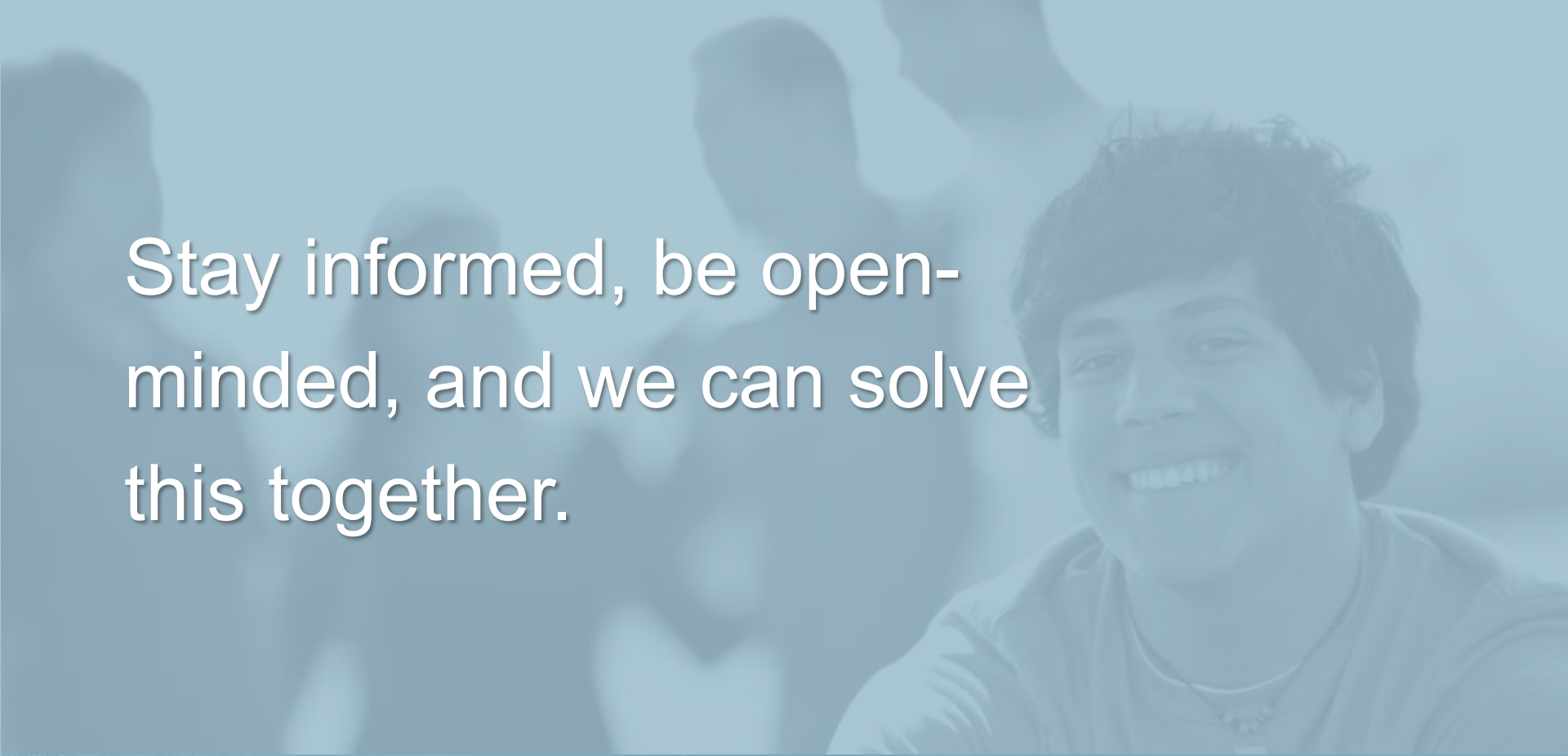
- Cohort is just as important as drugs
- Development of SUD is about risk/trajectory
- Risks can be identified and intervened on
- Risks may continue even with sobriety (shared so can lead to other pathology)

Marijuana and Early Drug Use

- Early drug use and alcohol use can affect development but...
 - More important to note that early users are self identifying as high risk
 - Think cohort
 - Mild marijuana use disorder

Traps for Clinicians

- Ranking one drug as better than another
- Dismissing early use as a “phase”
- Believing use is solely due to some other issue (mental health, depression, ADHD)
- Waiting for “full addiction” to set in



Stay informed, be open-
minded, and we can solve
this together.



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THANK YOU



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