

The Institute for Public Policy and Social Research  
College of Social Science - Michigan State University

# Understanding the Neurobiological Basis of Addiction and Applying it to Rational Therapies

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No Disclosures

## transitions to chronic substance use

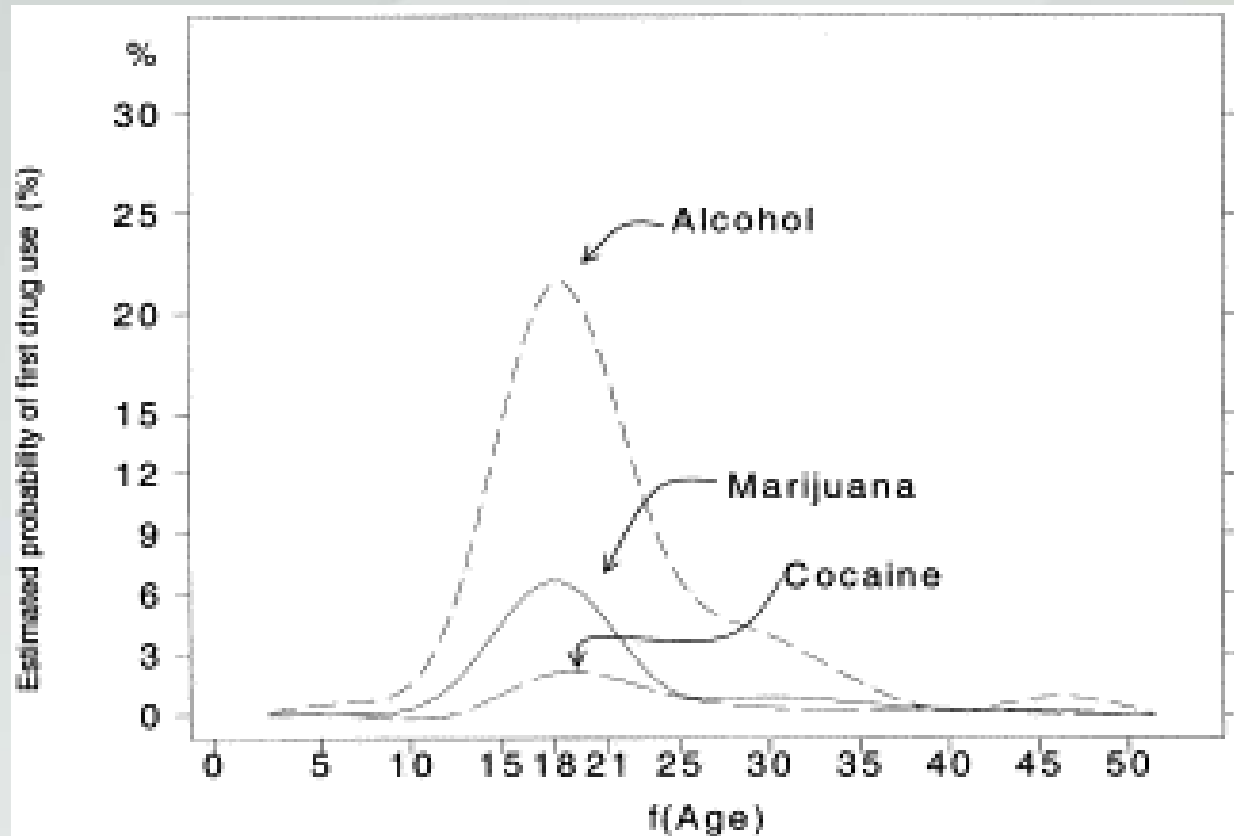
- 1) voluntary use in search of a hedonic experience
- 2) loss of control over this behavior
- 3) habitual and compulsive behavior



Rewards!  
increase dopamine levels in nucleus  
accumbens

What causes increases in dopamine?

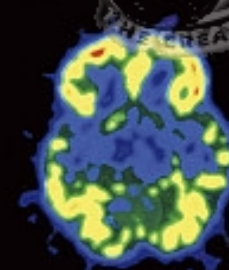
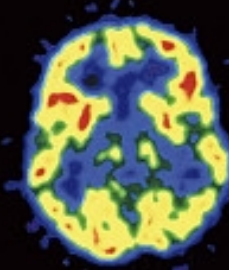
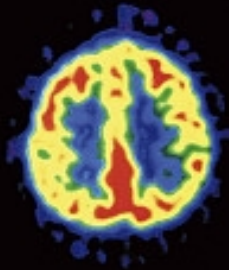
Any drug of abuse.....



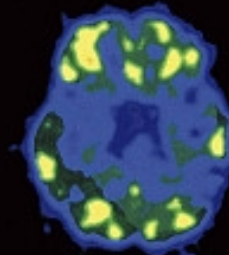
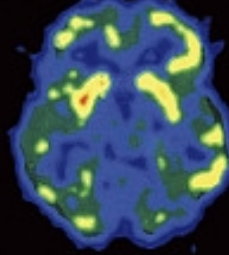
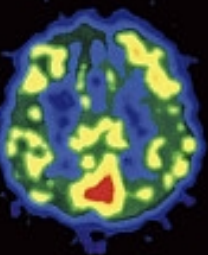
Estimated age-specific risk for first use of selected drugs. Data from the U.S. National Comorbidity Survey, 1990-92.

Wagner F and Anthony J. **From First Drug Use to Drug Dependence: Developmental Periods of Risk for Dependence upon Marijuana, Cocaine, and Alcohol** *Neuropsychopharmacology* (2002) 26 479-488

# BRAIN METABOLISM

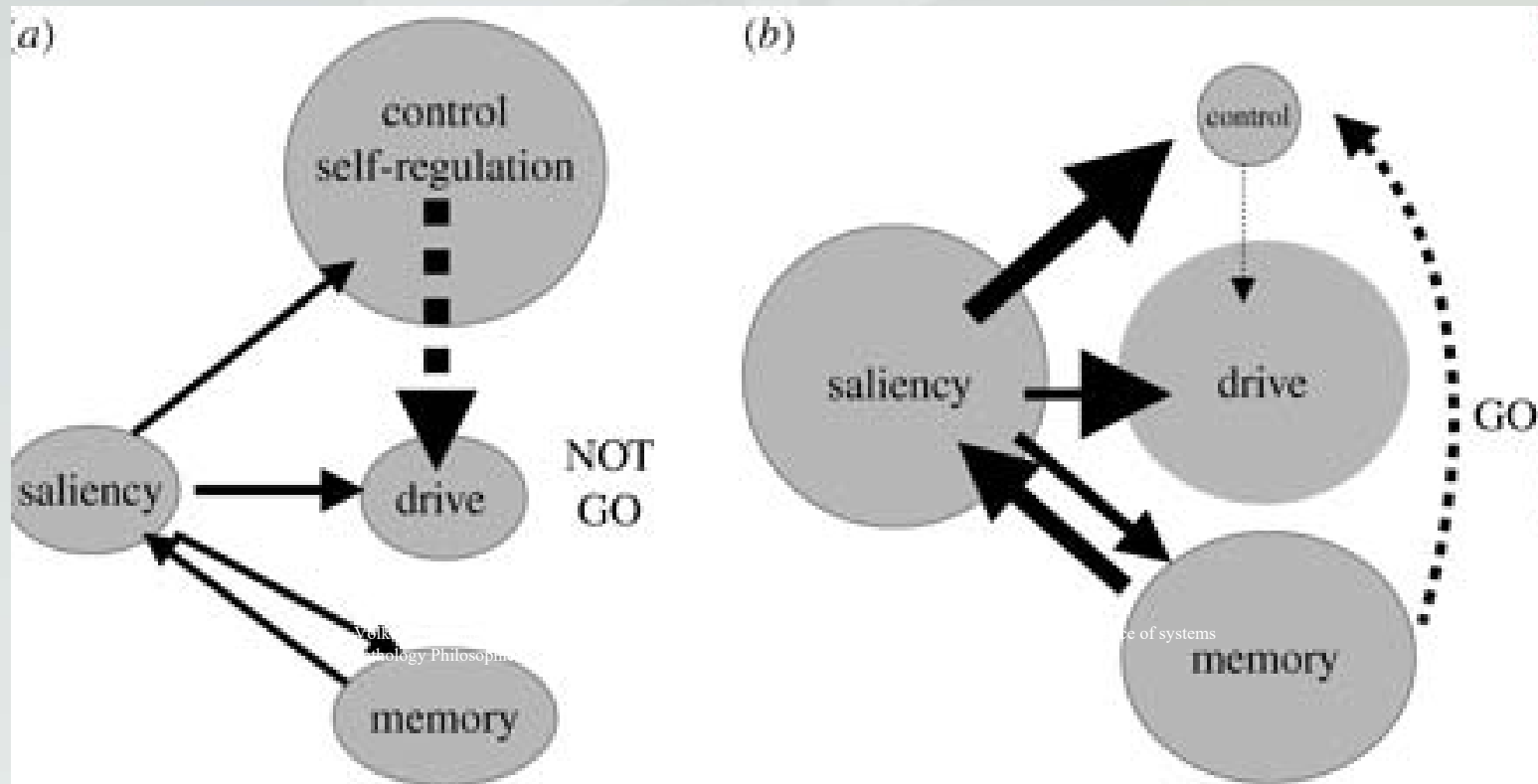


NORMAL

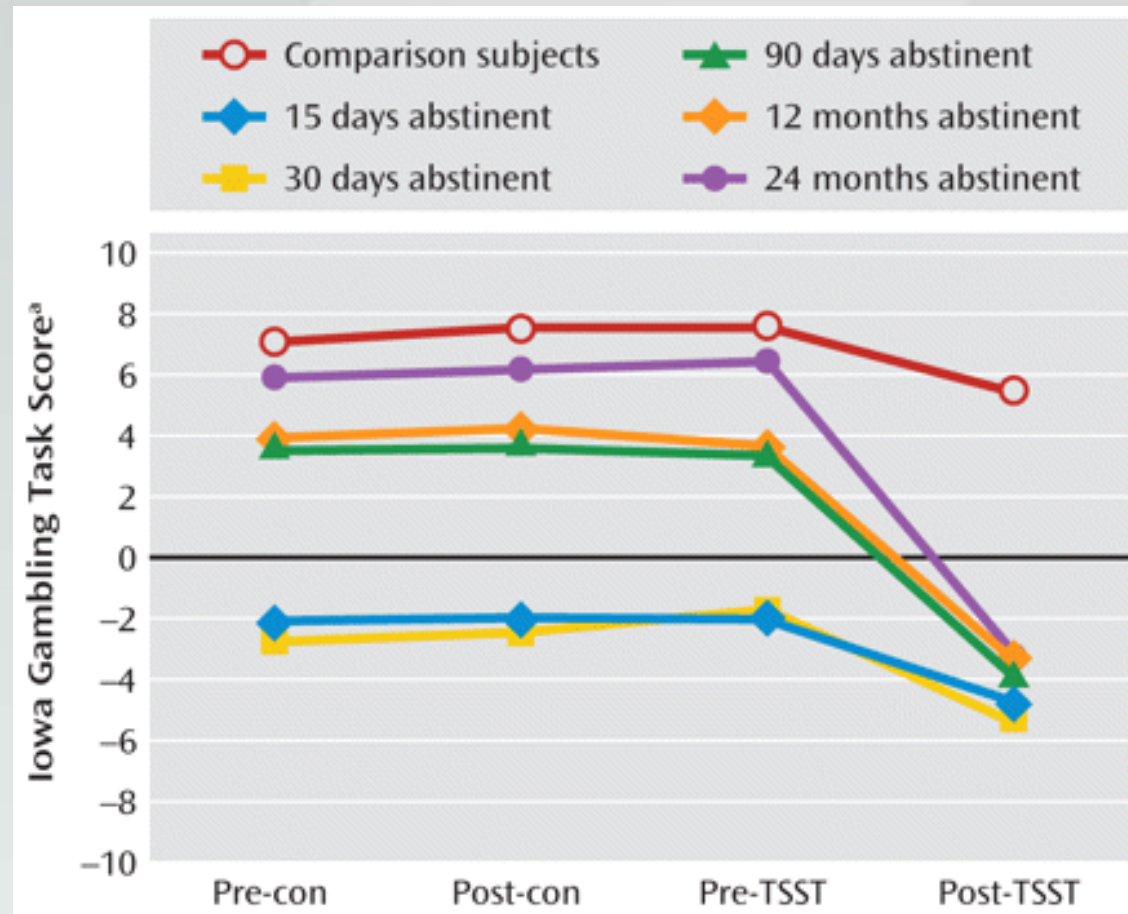


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# Immature vs mature brain vs “substance abuse” brain

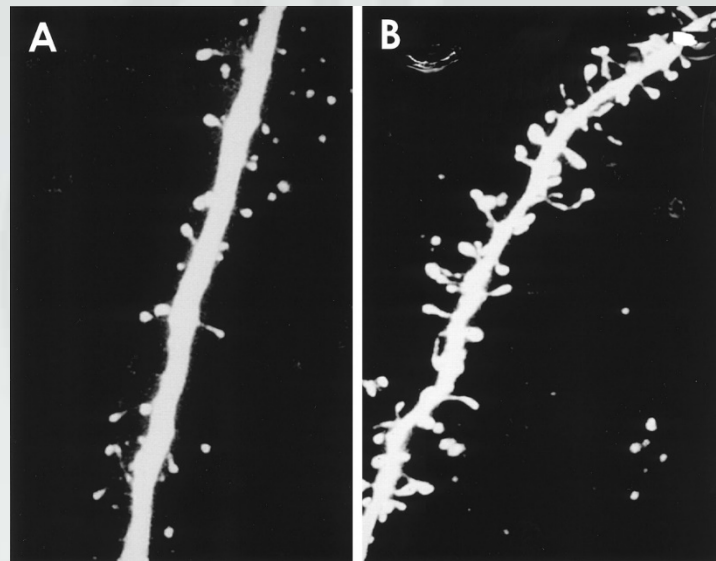






Effects of Stress on Iowa Gambling Task Scores in Formerly Heroin-Dependent Patients at Different Abstinence Times

Effects of Stress on Decision-Making Deficits in Formerly Heroin-Dependent Patients After Different Durations of Abstinence. Xiao-li Zhang et al Am J Psychiatry 2011; 168:610-616



adolescents are peculiarly vulnerable to substance abuse due to particular neurobiological vulnerabilities based on immature CNS structures

- abstinent abusers have defects in judgment
- neurobiological alterations remit after some time period
- BUT when the organism is stressed, they return even after long periods of abstinence


- abusers need to be in treatment for long periods of time
- when stressed they need to recognize the need to return to treatment

## Strategies that improve frontal lobe function

- dialectical behavioral therapy
- cognitive behavioral therapy

## Strategies that take advantage of social hierarchy and position in primate groups

- group therapies
- family therapies
- advancing social status



Medications for:  
Alcohol use  
Opioid use