BRAINS, ENVIRONMENTS, AND EFFECTIVE PUBLIC POLICY REGARDING ADDICTION

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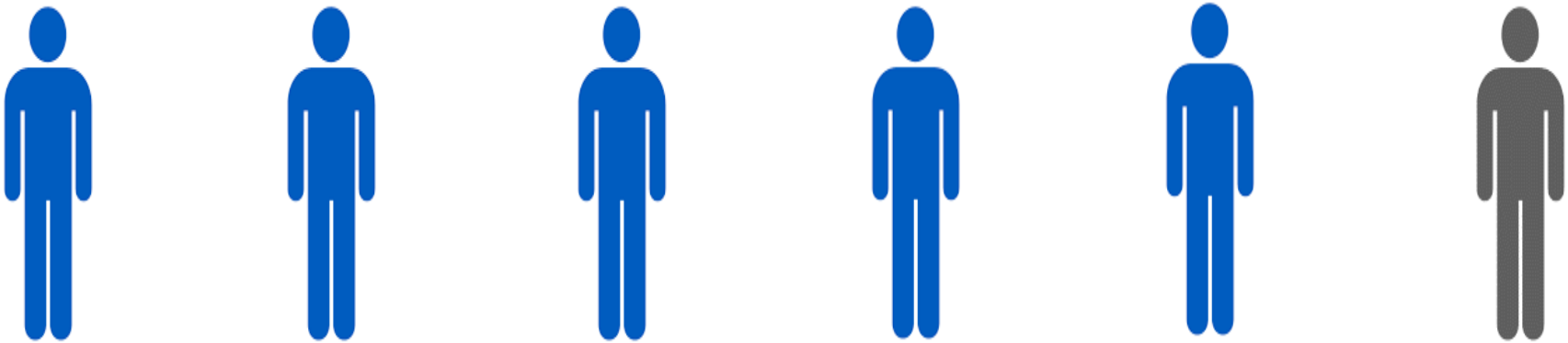
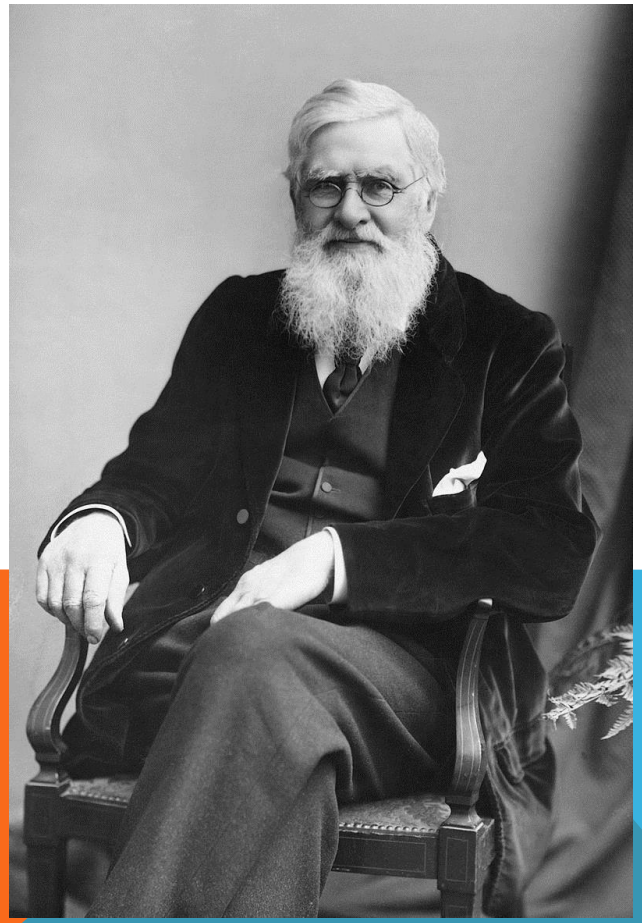
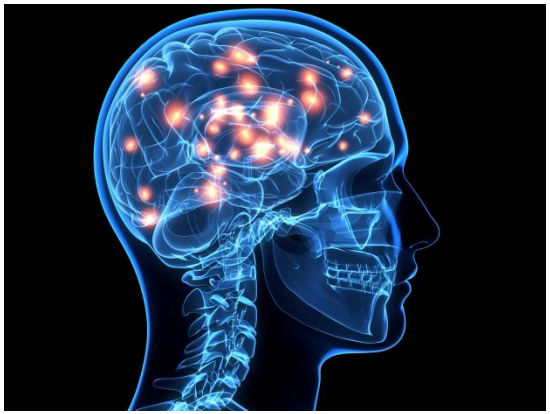
Source: Humphreys, K., Malenka, R.C., Knutson, B., & MacCoun, R.J. (2017). *Science, 356*, 1237-1238.

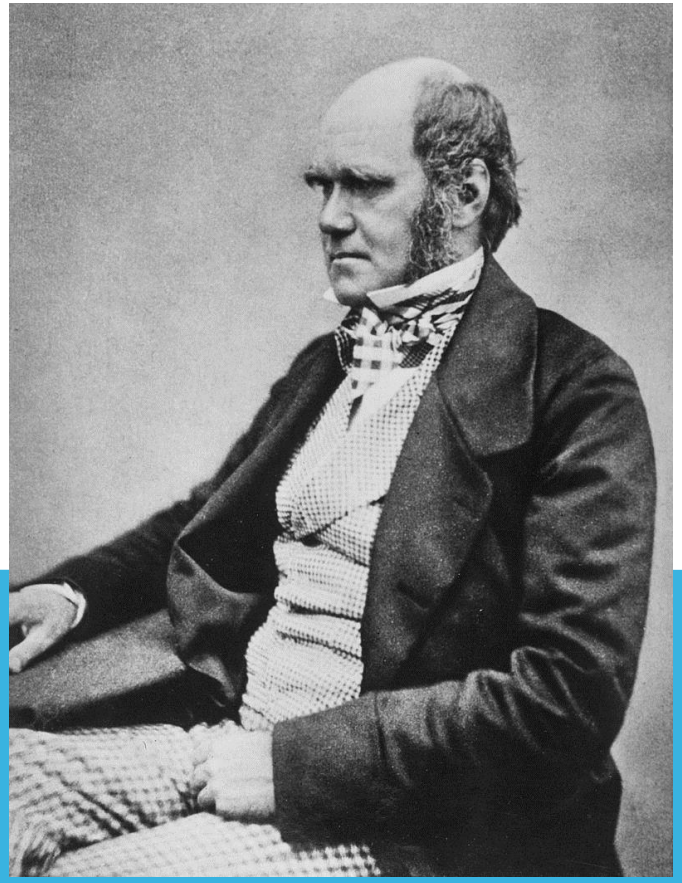
HOW DID WE GET TO THIS LEVEL OF DAMAGE?



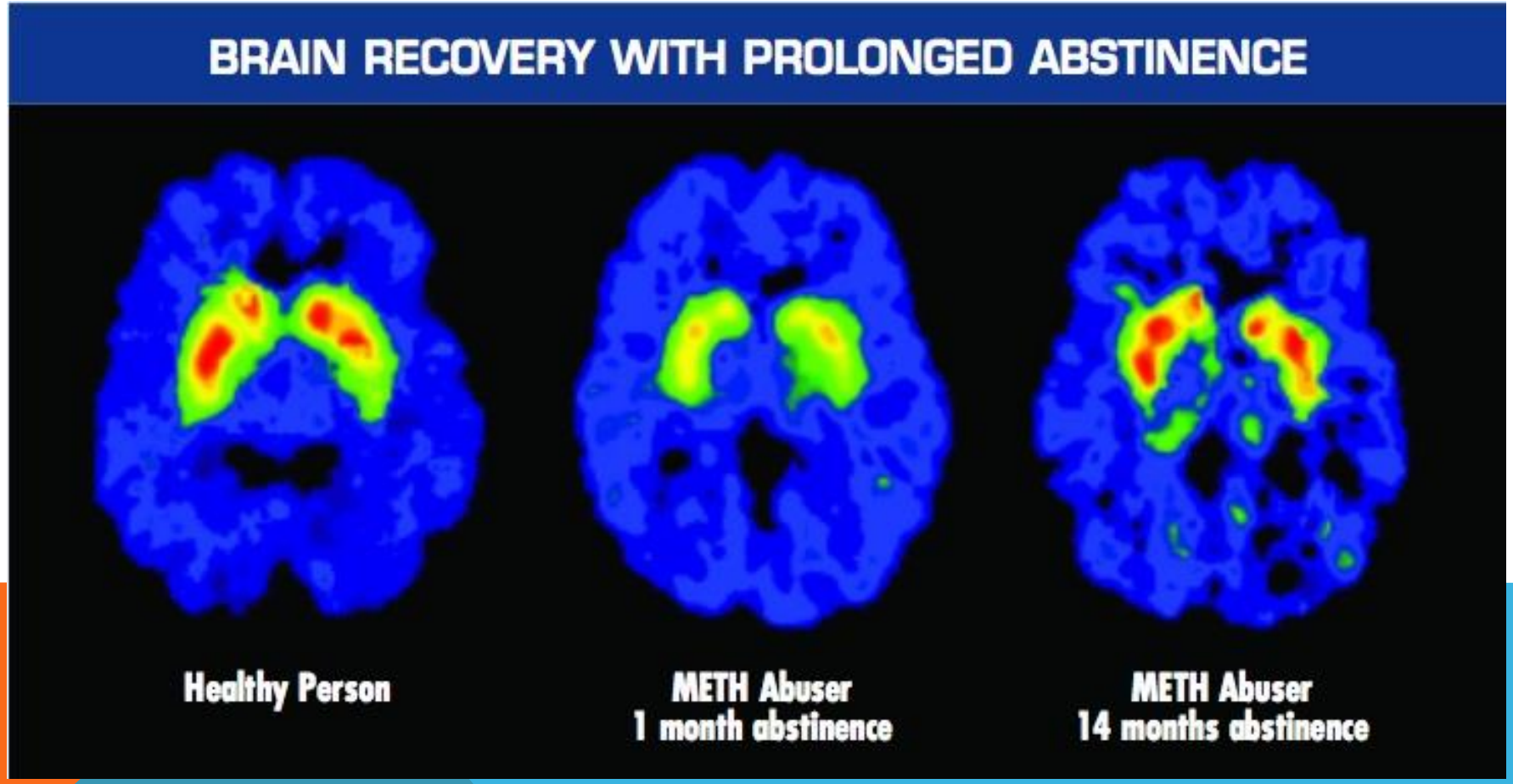
EVOLUTION AND THE HUMAN BRAIN







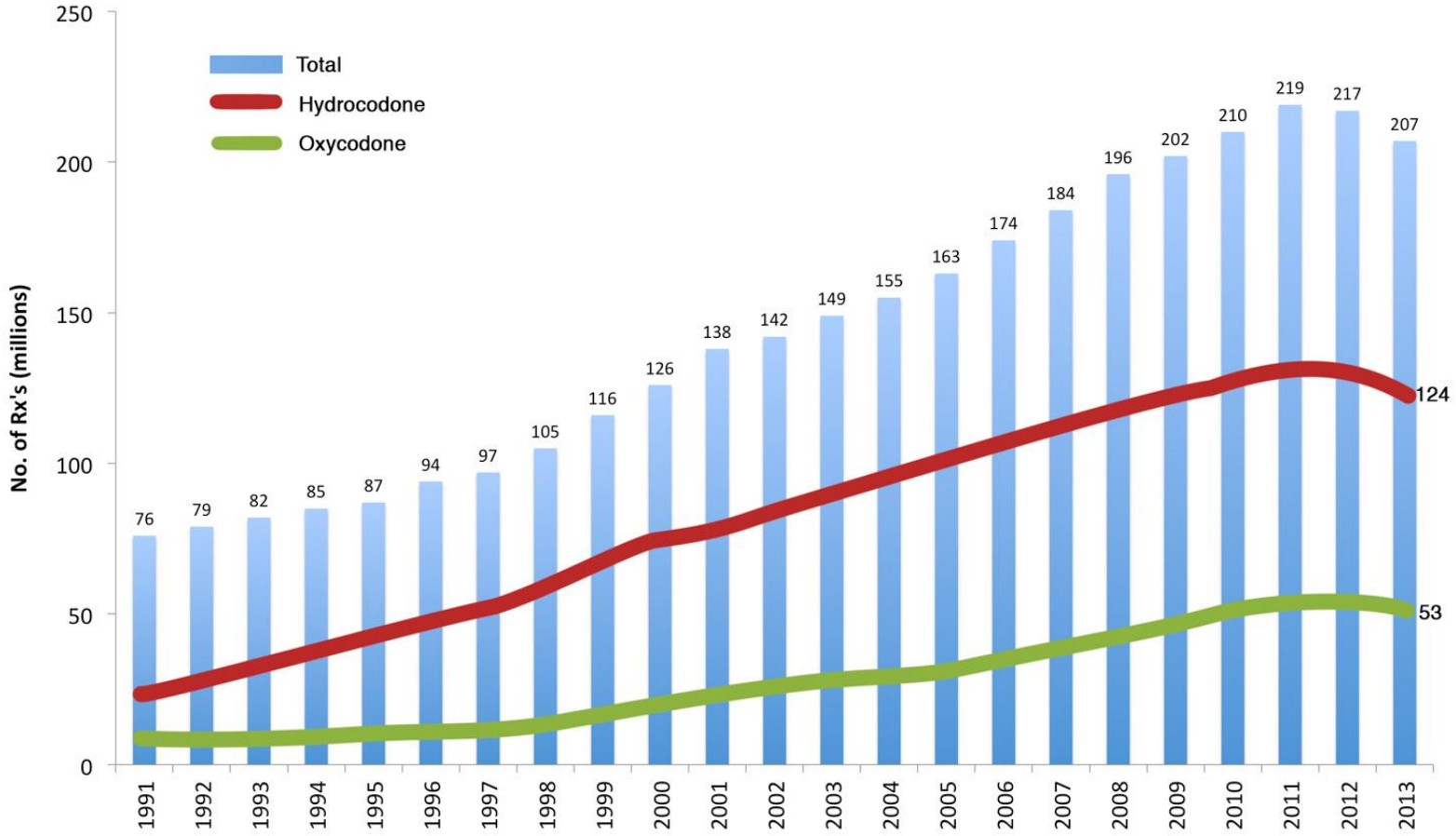
THE ADDICTED STATE PERSISTS BEYOND USE/INTOXICATION



Volkow et al., 2001, Am J Psychiatry

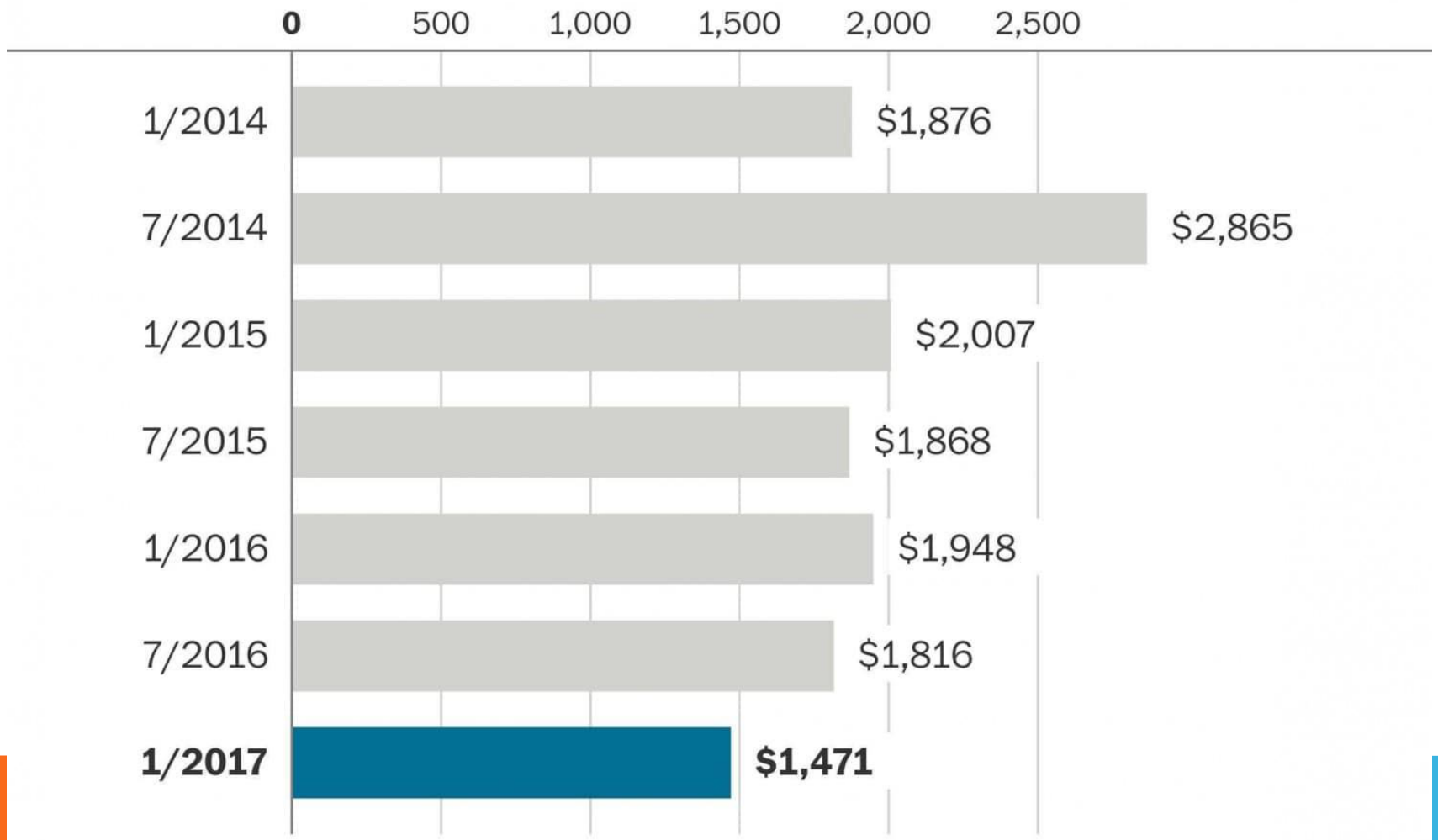

@JT
John Tewell

NUMBER OF U.S. OPIOID PRESCRIPTIONS, 1991-2013



TO DEVELOP IS TO CONSUME...

Wholesale Price Per Pound of Marijuana in Colorado, 2014-2017



Source: Colorado Department of Revenue

WASHINGTON POST

ADDICTIVE SUBSTANCES TECHNOLOGY

1853	Hollow steel hypodermic needle
1867	First cigarette rolling machine
1874	Heroin synthesized
1887	Amphetamines synthesized
1898	Cocaine synthesized
1913	Camel blended tobacco cigarette
1949	Commercial jet age begins
1980	Al Gore invents Internet

RISING ADDICTION IN HUMANS IS A CASE OF "SOMETHING OLD, SOMETHING NEW"

Brains don't exist without a context and a behavioral interaction between the organism and that context

Addiction is a modern plague because the brains we have evolved are living an unprecedentedly substance-saturated environment

Thus, contrary to how it is sometimes interpreted, the neuroscience of addiction drives us *toward* public health/environmental policy initiatives

SELECTED POLICY IMPLICATIONS

ADAM SMITH HAS A SERIOUS DRUG PROBLEM

The “invisible hand” upon which free markets depend is of no value when the brain is impaired

Free markets in addictive substances promote freedom for sellers while reducing it for buyers

Societies thus have the warrant and interest to restrict sellers far more tightly than they do rather than treat addictive substances as “ordinary commodities”

VULNERABILITY TO ADDICTION PEAKS WHERE HIGH NEURAL PLASTICITY MEETS AVAILABILITY

- Repeated administration produces changes in receptors and synaptic connections in the brain
- These reinforce and are reinforced by use behaviors and learned associations
- These processes are more rapid and enduring in younger brains (but only if they have access)
- This suggests value of programs that prevent or even delay initiation as well as those that establish competing rewards

ADDICTION IS CHARACTERIZED BY STRONG URGES TO USE, REDUCED EXECUTIVE CONTROL, AND SHORTENED TIME PERSPECTIVE

- The urge to use can become more intense than desire for food, sleep, water etc.
- Prefrontal region impairments
- Behavioral discounting increased in addiction

YET CRIMINAL JUSTICE SYSTEM (AND SOME HEALTH CARE) ASSUMES A BRAIN THAT PEOPLE DON'T HAVE

"If you don't take out the garbage right now, there is a 40% chance that 6 months from now I will ground you for decade"

- Interventions are more likely to work if they map onto the realities of the addicted human brain

- In treatment settings, good examples are low-threshold services and contingency management

Janet Lackey

CONCLUSION

Despite the sturm und drang about the “brain disease of addiction versus public health policy”, neuroscience actually points us toward the environment

Many clinical and public health policies with evidence behind them from other scientific fields are also consistent with neuroscience findings

Neuroscience helps us understand the causal mechanisms behind and rationale for a range of policies reducing access to substances (especially for the young), regulating industries tightly, and incorporating contingency management into criminal justice and clinical care settings