



Social determinants of central nervous system (CNS) dysfunction in research and clinical practice: a lesson from HIV

Leah H. Rubin, PhD, MPH

Associate Professor of Neurology, Psychiatry & Behavioral Sciences, & Epidemiology

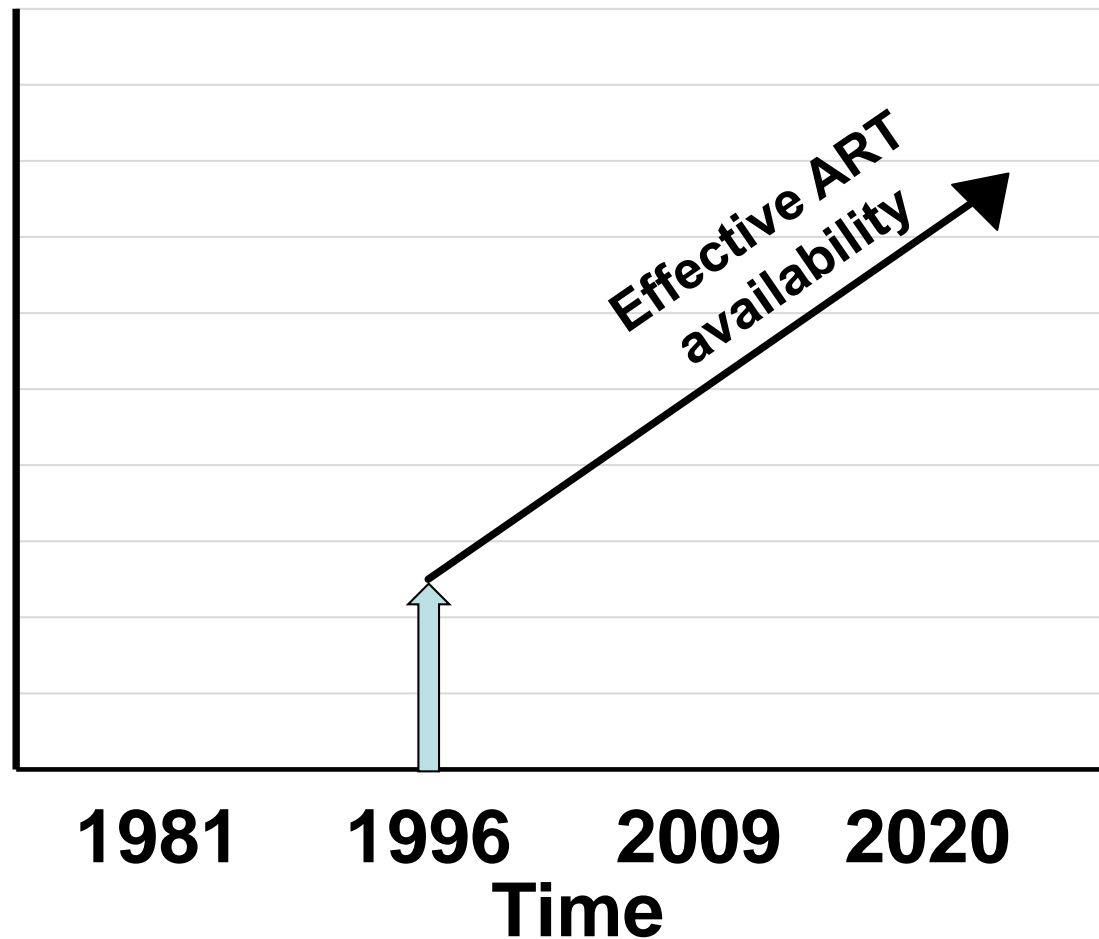
SETTING THE STAGE

Angels in America

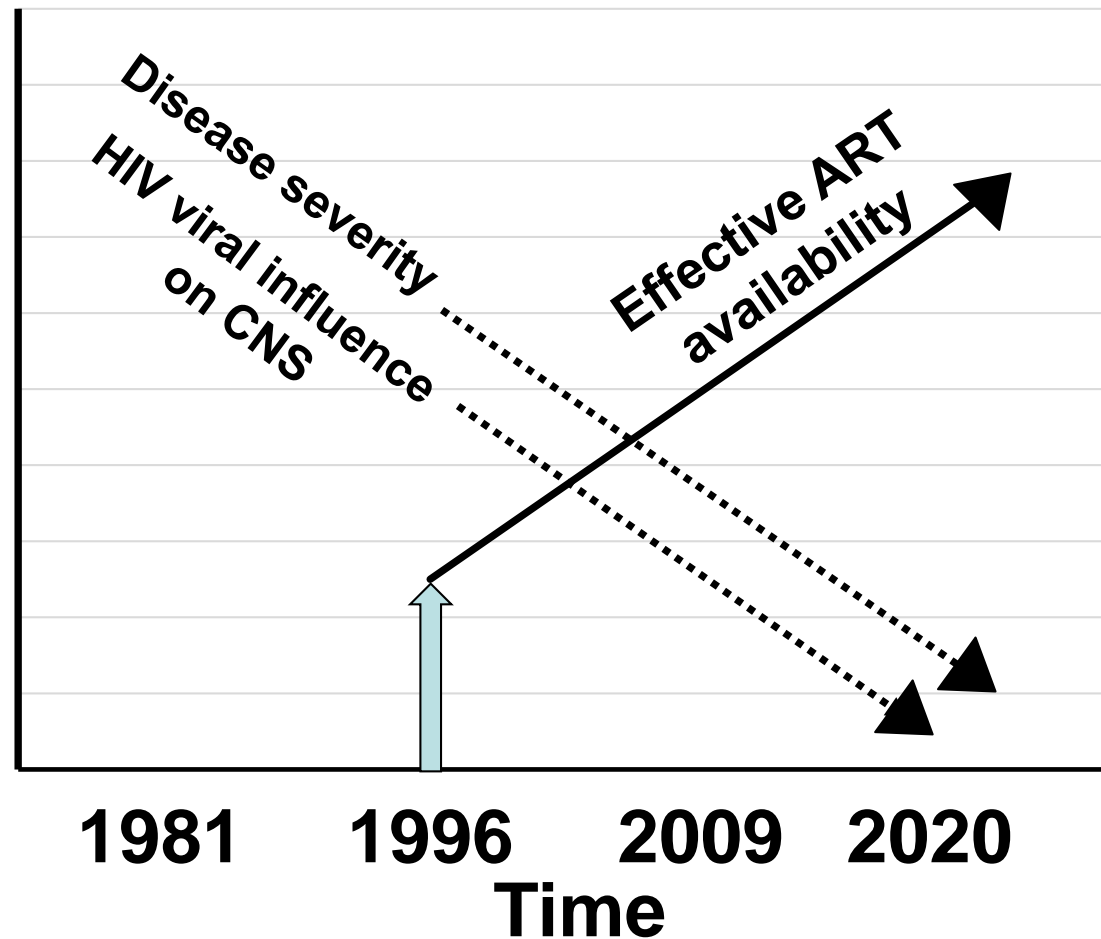


Written by: [Tony Kushner](#)

Times they are a-changin...

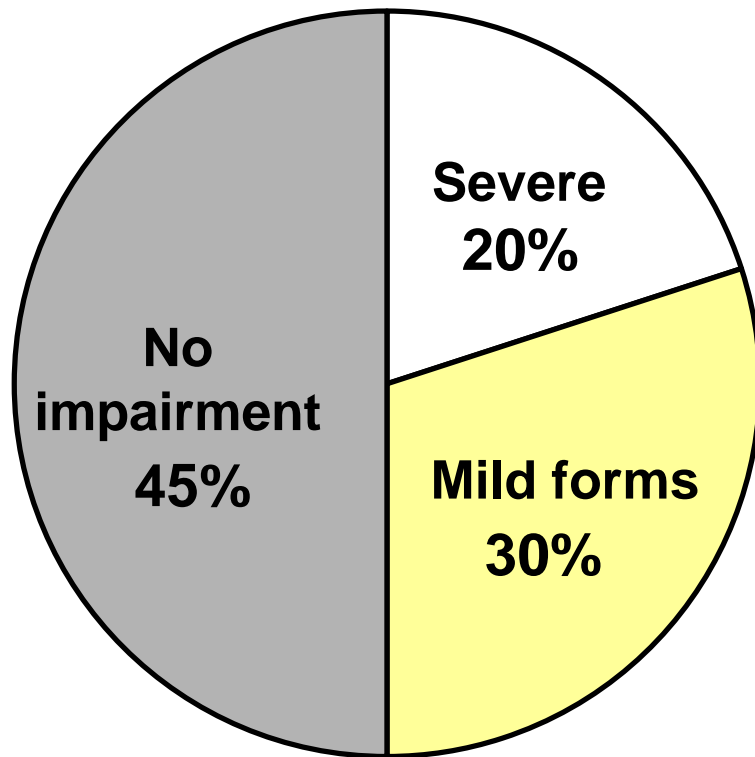


Times they are a-changin...

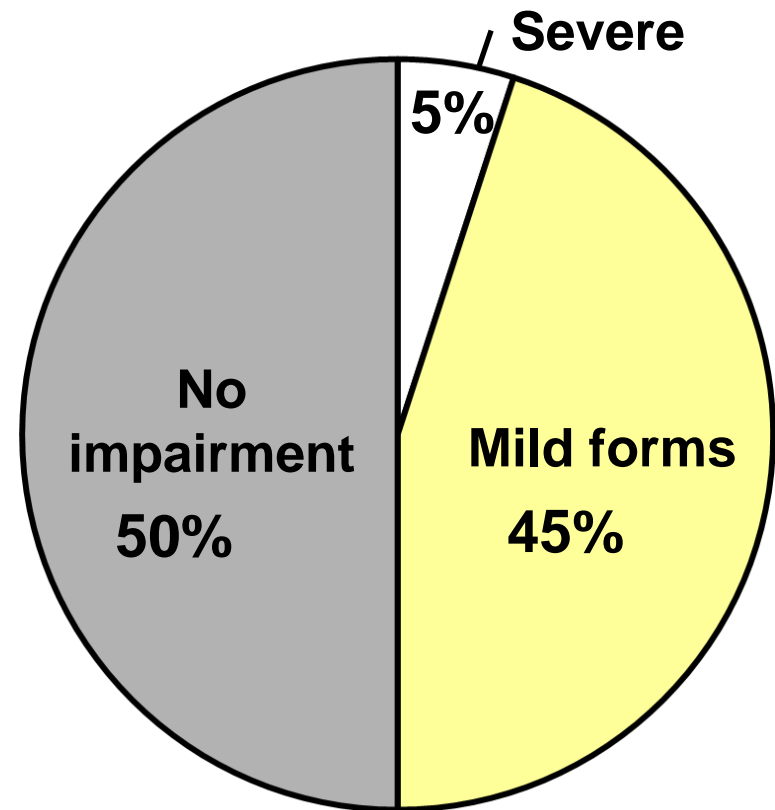


The prevalence of HIV-related dementia decreased after antiretroviral therapy (ART) became available for the treatment of HIV

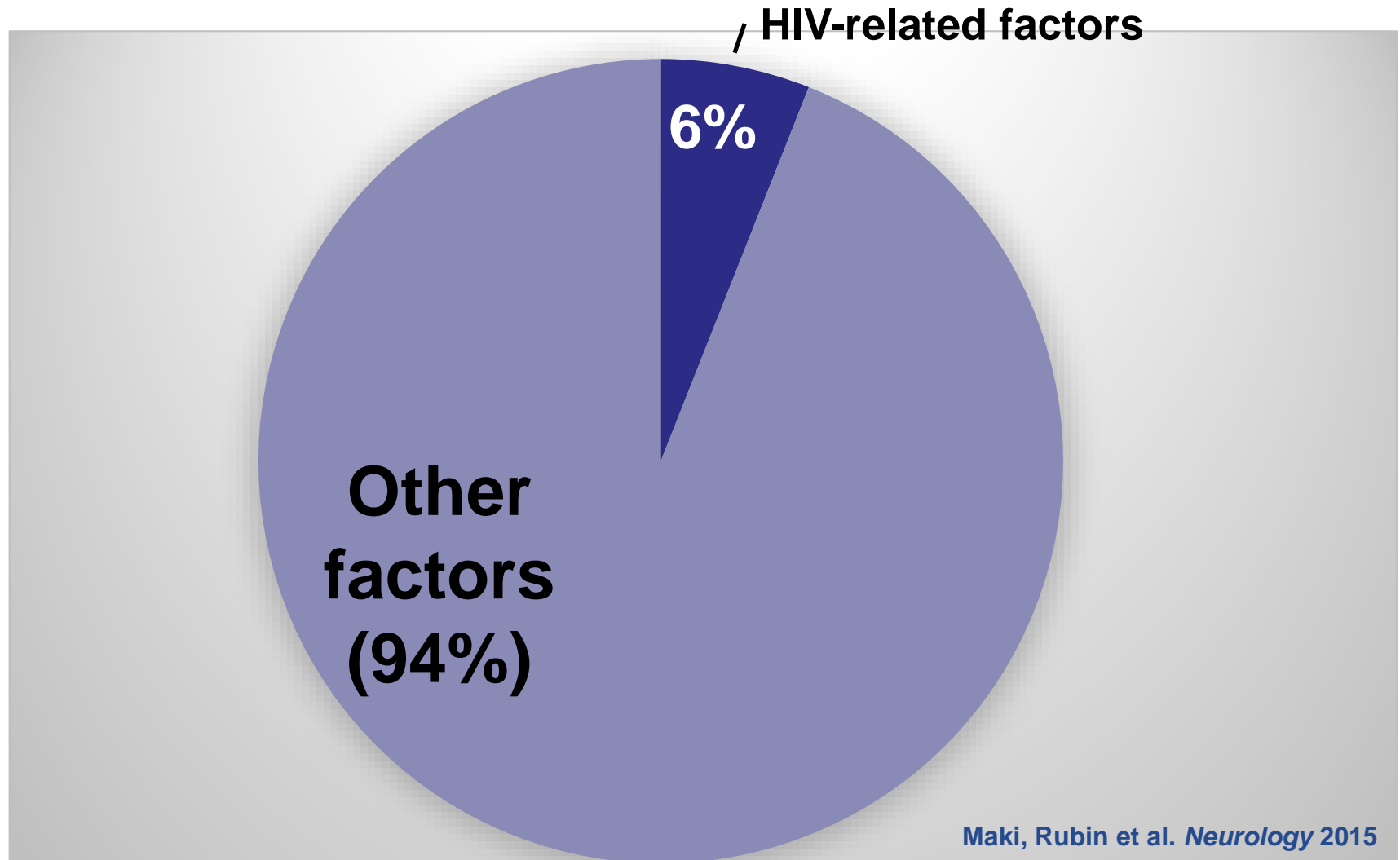
Pre- effective ART



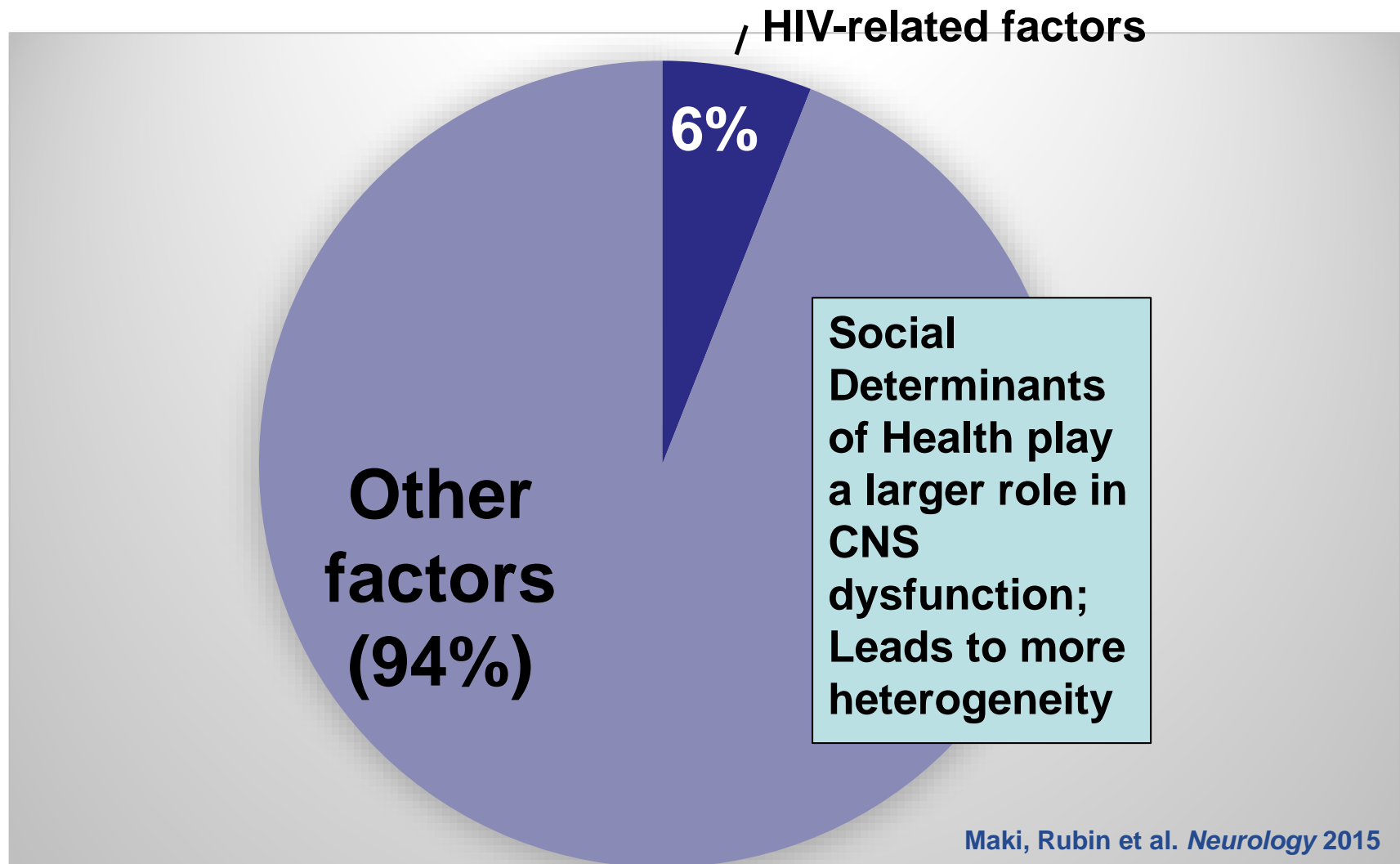
Effective ART



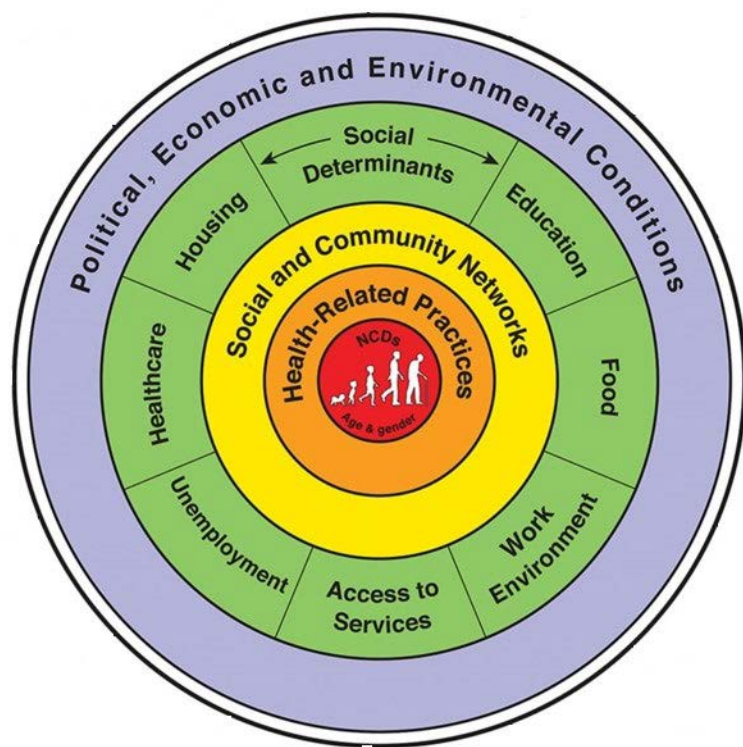
Among people with HIV, what contributes to CNS dysfunction?



Among people with HIV, what contributes to CNS dysfunction?



What are the social determinants of Health?



Examples

Income level

Educational opportunities

Occupation, employment status, etc

Gender inequity

Racial segregation

Food insecurity & inaccessibility of nutritious food choices

Access to housing & utility services

Early childhood experiences & development

Social support, community inclusivity

Crime rates, exposure to violent behavior

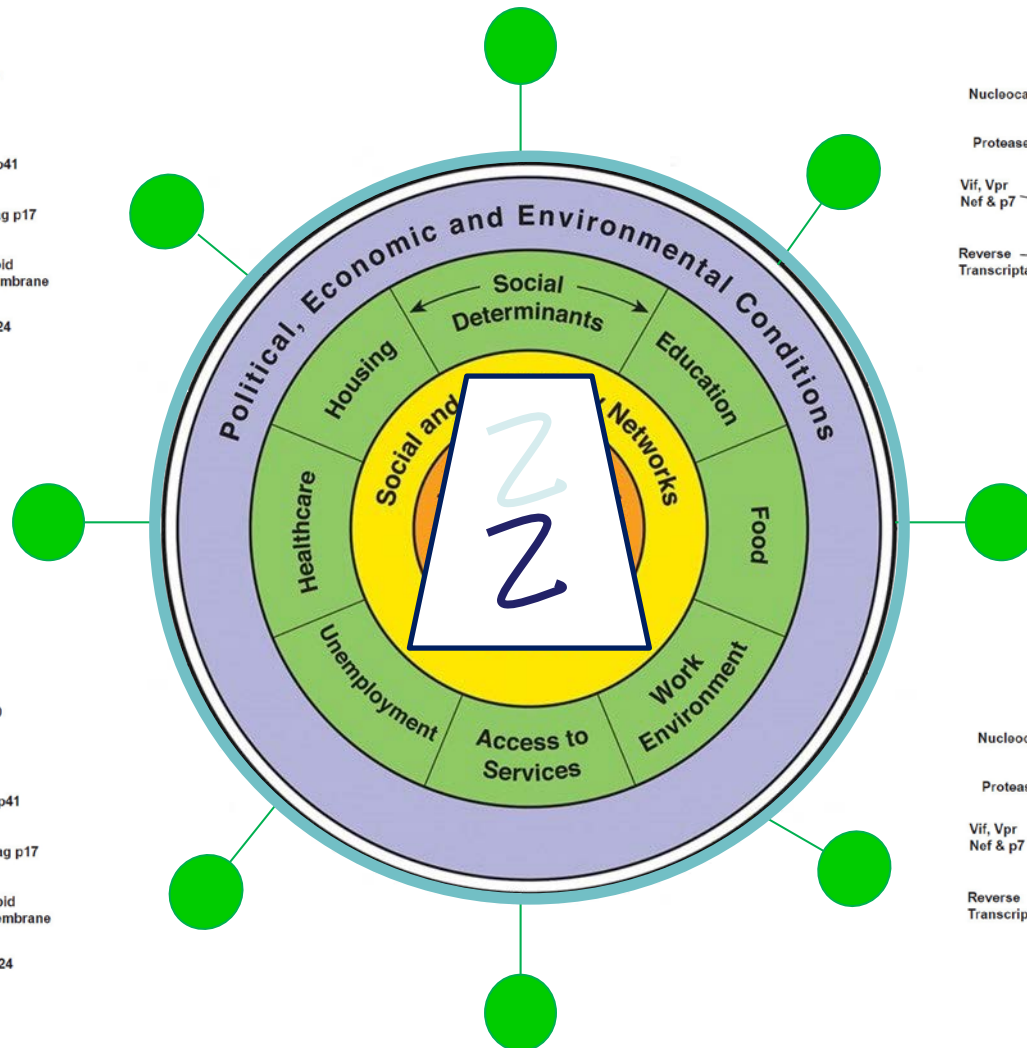
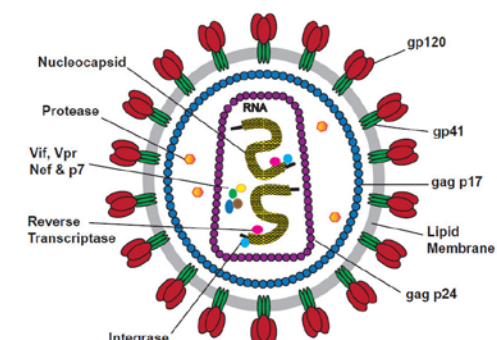
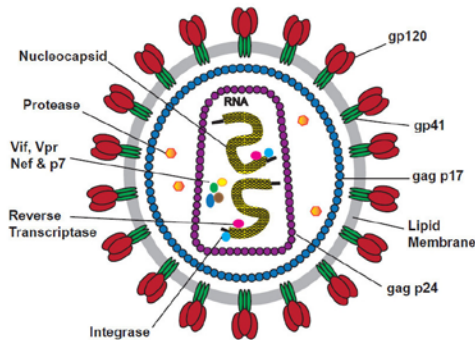
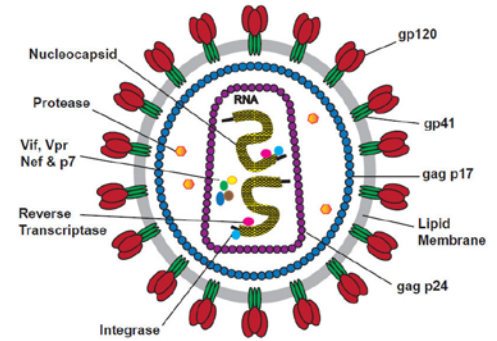
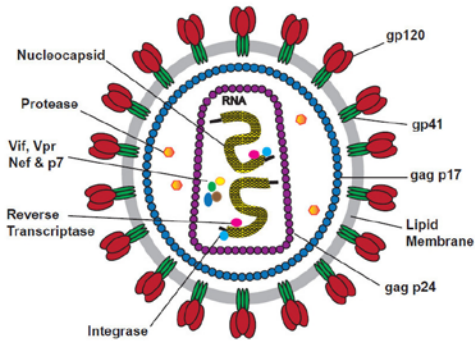
Neighborhood conditions

<https://catalyst.nejm.org/doi/full/10.1056/CAT.17.0312>

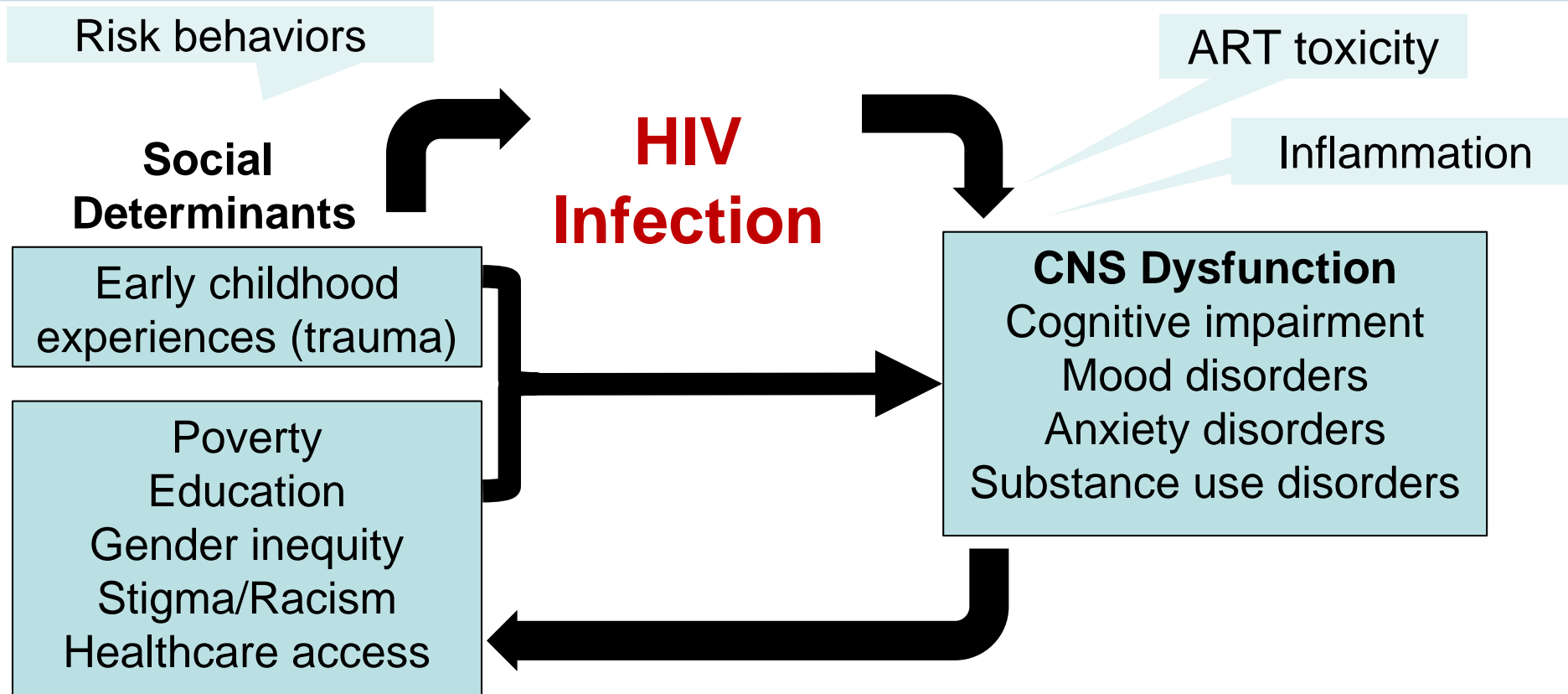
<https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health/interventions-resources>

Singer 2009;
Dahlgren &
Whitehead 1991

Social determinants of health in the context of a chronic illness: HIV



Conceptual Model



Women with HIV may be at increased risk for CNS dysfunction because important social determinants of health compared to men with HIV

- Poverty
- Low literacy levels
- Low educational attainment
- Barriers to health care services
- Environmental exposures



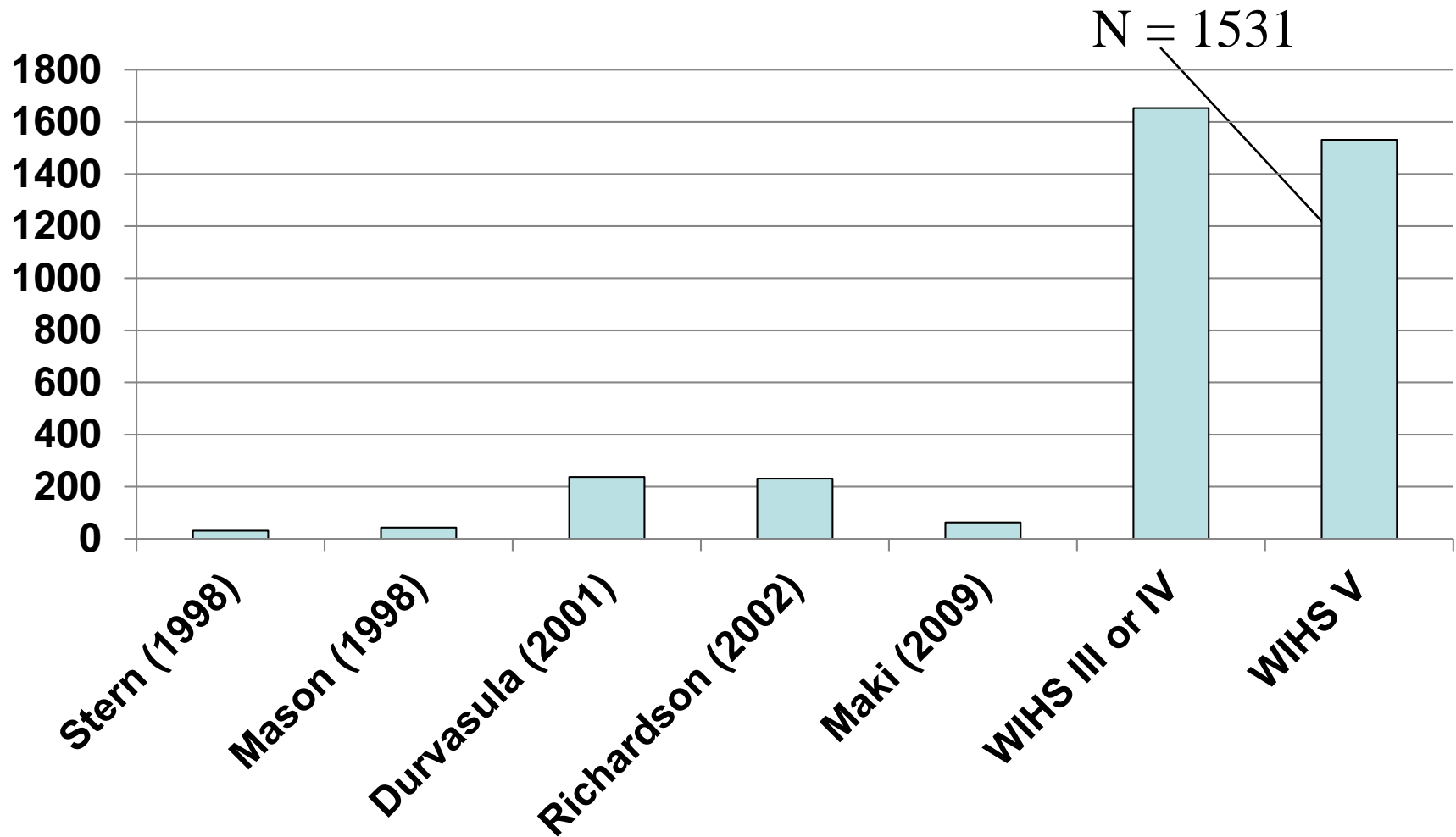
Which in turn lead to:

- Substance abuse/substance use disorder
- Poor mental health
- Cognitive impairment

Maki and Martin-Thormeyer, *Neuropsychol Rev* (2009);
Maki, Rubin, *Neurology* (2015);
Rubin and Maki, *Current Psychiatry Reports* (2019)

Significance

Sample sizes in studies of women with HIV



Significance

Sample sizes in studies of women with HIV

1800

In 2018, Blacks/African Americans **and** Hispanics/Latinos accounted for **69% of HIV diagnoses** but comprised only 31% of the U.S. ** population.



Black/African American



Hispanic/Latino



White



Other†

** Diagnoses by race/ethnicity for the United States only † American Indian/Alaska Native: <1% • Asian: 2% • Native Hawaiian/Other Pacific Islander: <1% • Multiple races: 3%

N = 1531

800

600

400

200

0

Stern (1998)

Mason (1998)

Durvasula (2001)

Richardson (2002)

Maki (2009)

WIHS III or IV

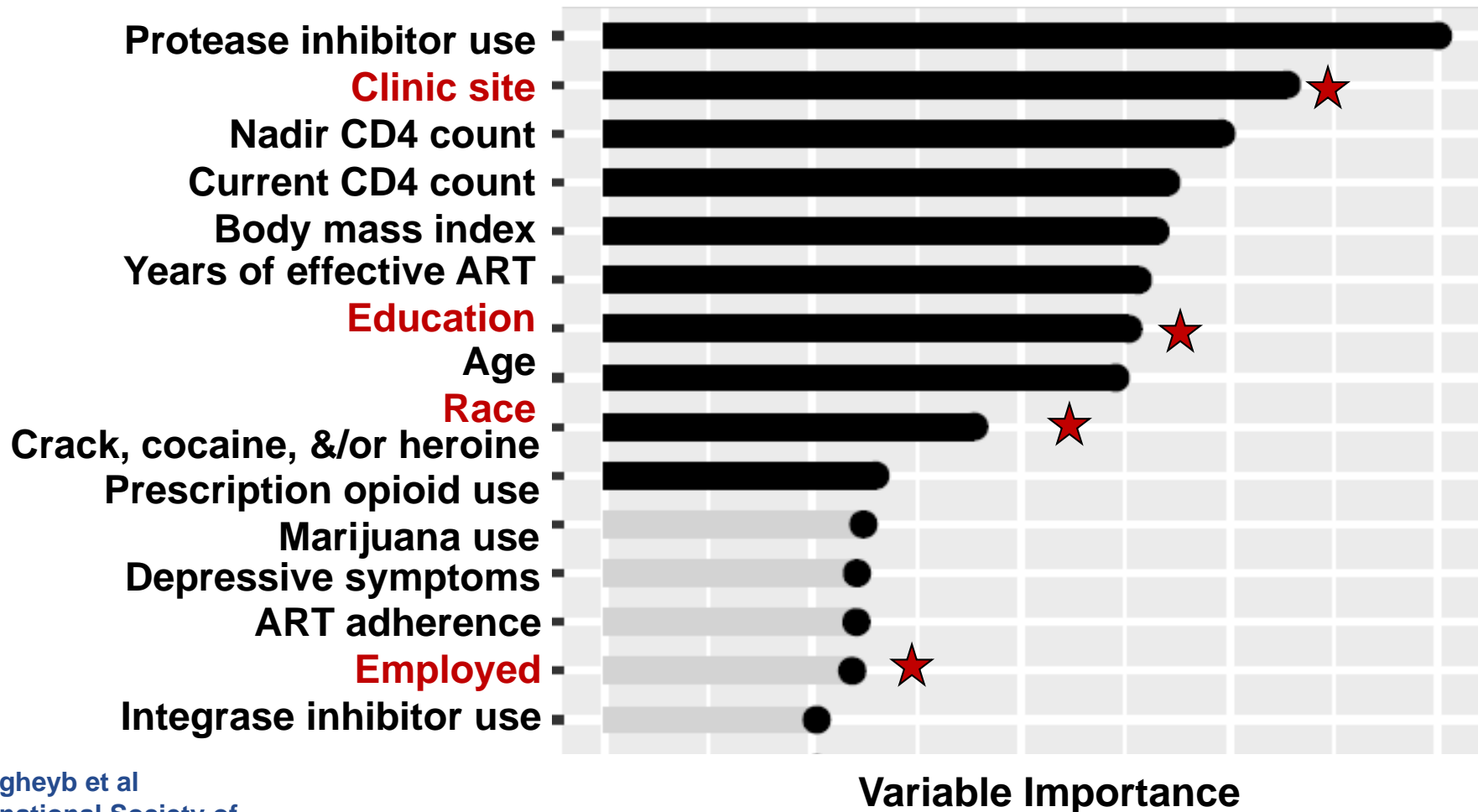
WIHS V

Characteristics of women with HIV in the WIHS

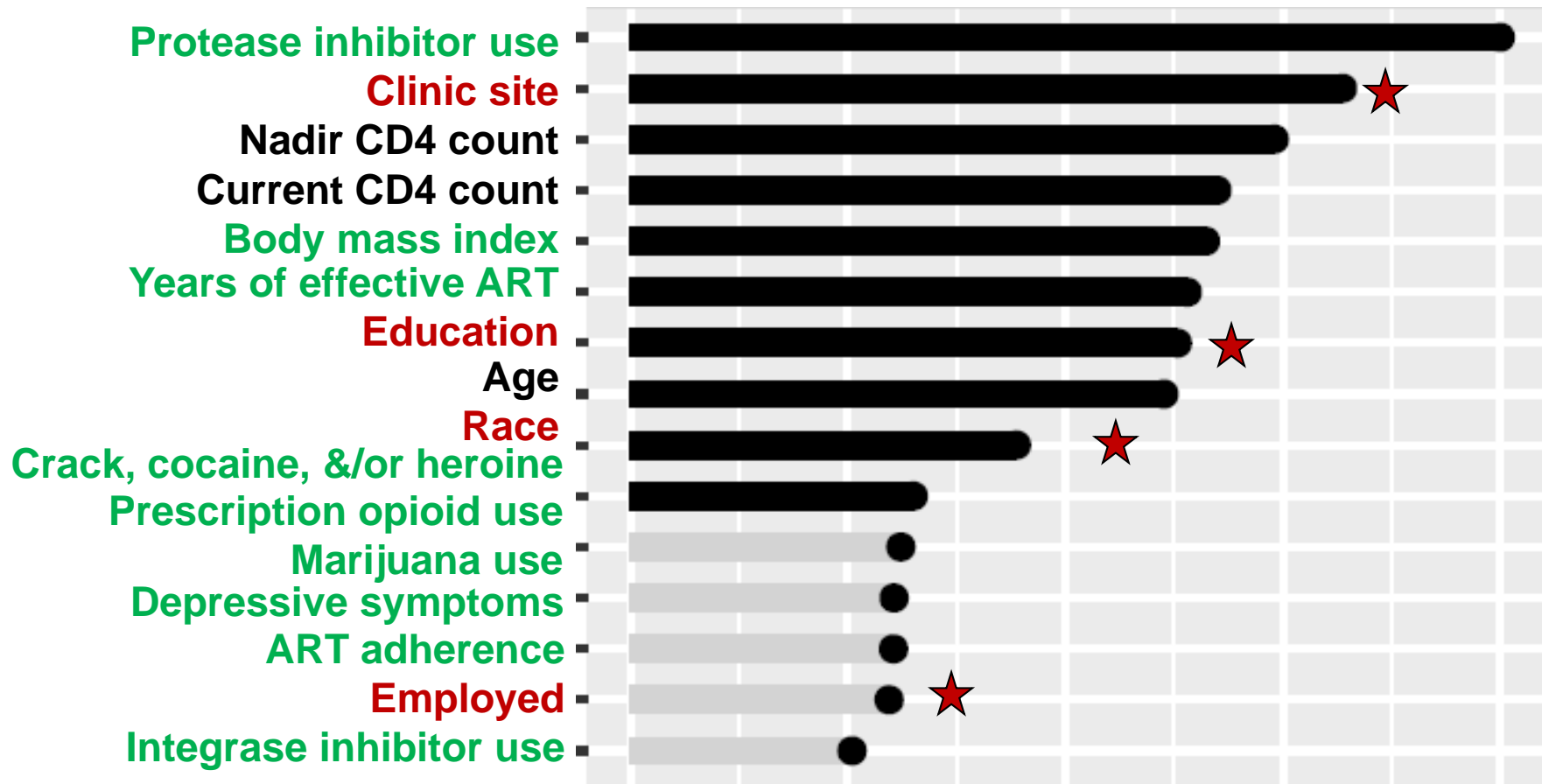
	Virally Suppressed (n=929)	Not virally suppressed (n=625)
Age, M (SD)*	46 (8)	45 (9)
Years of education, M (SD)	12 (3)	12 (3)
Black, non-Hispanic	71%	71%
Hispanic	12%	14%
Income (\leq \$12,000/year)	49%	49%
Clinic site location		
Chicago, DC, LA, NY, SF	65%	82%
Atlanta, Birmingham, Chapel Hill, Jackson	35%	18%
Unemployed	61%	66%

*p <0.05

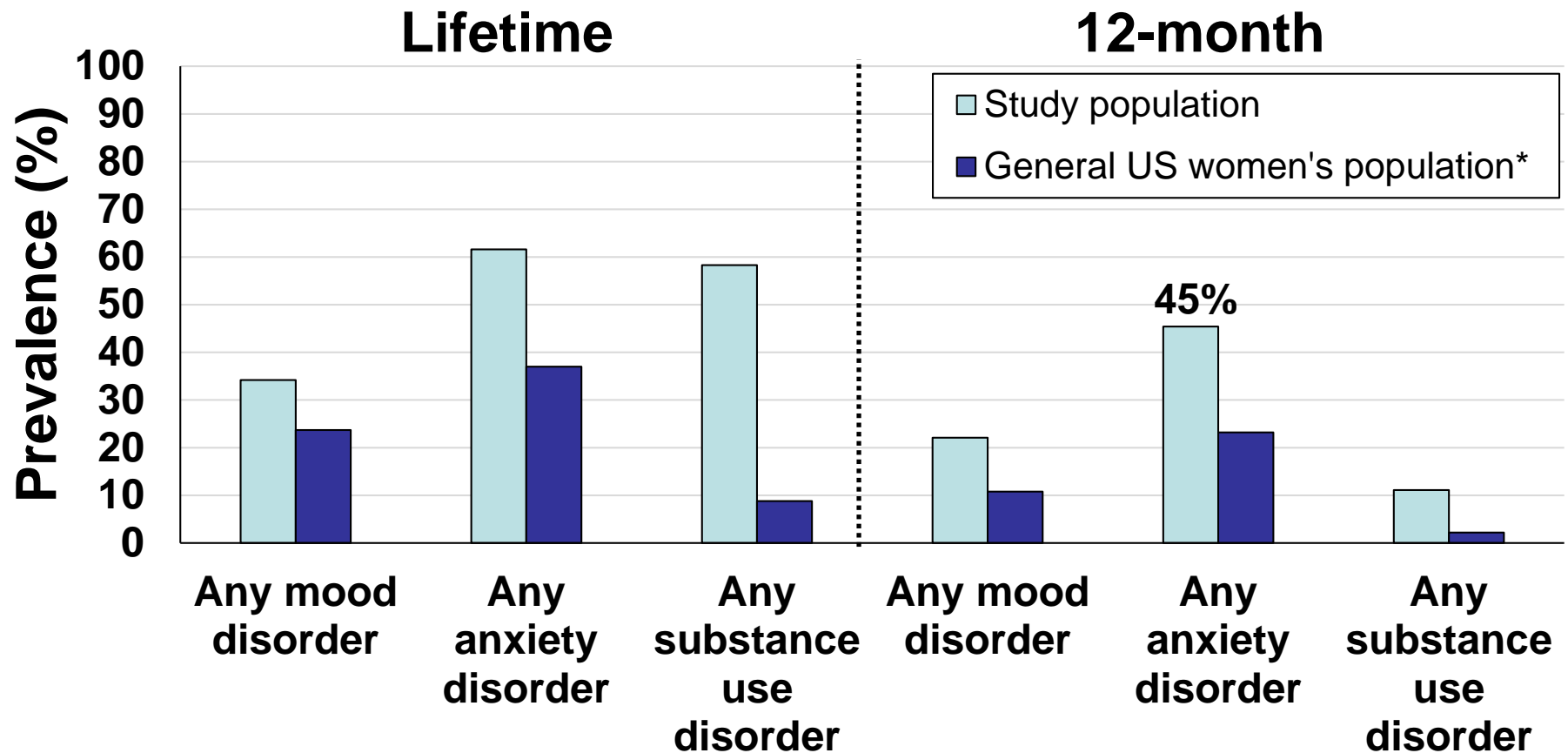
Social determinants of CNS dysfunction in 929 women with HIV despite viral suppression



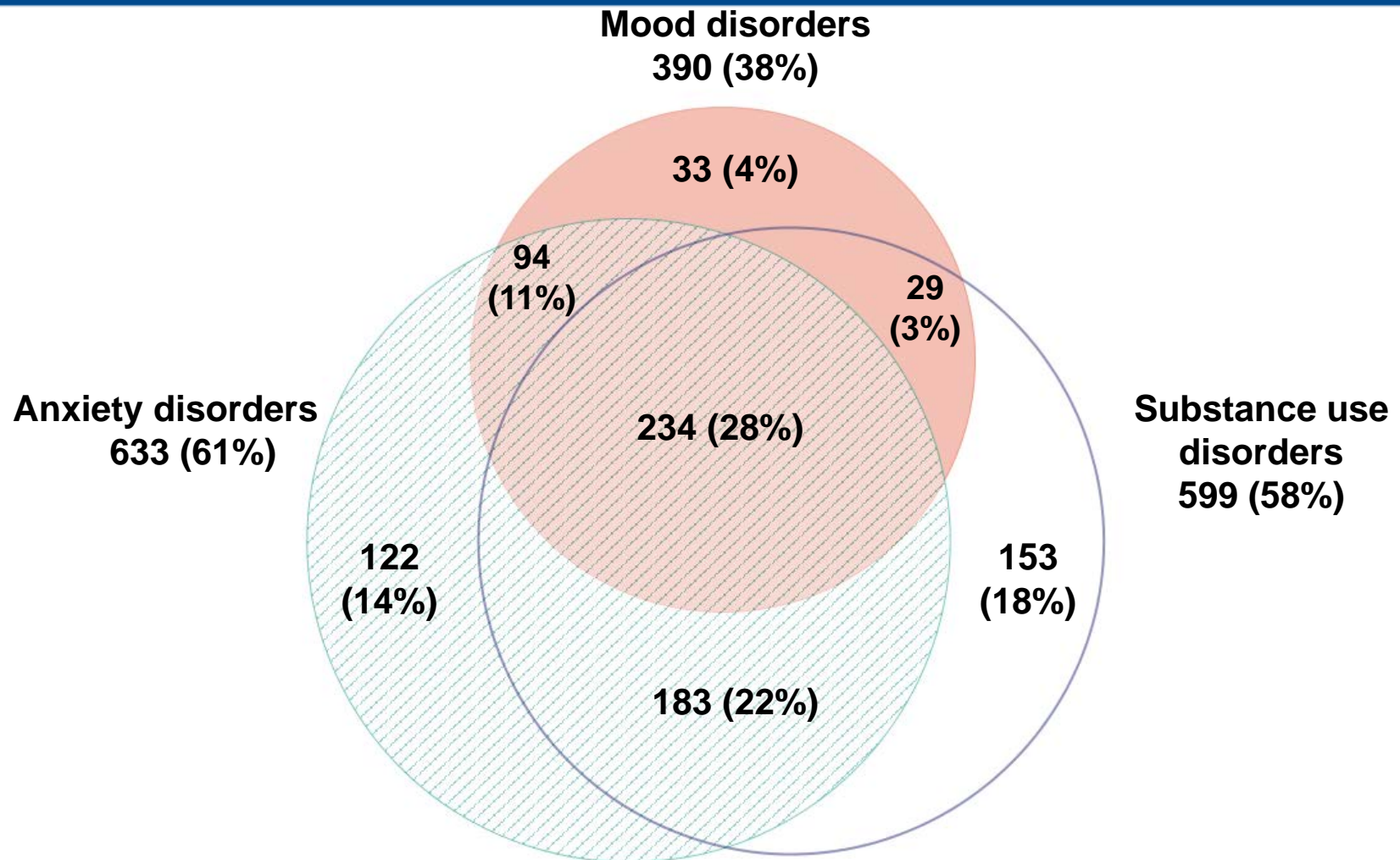
Social determinants of CNS dysfunction in 929 women with HIV despite viral suppression



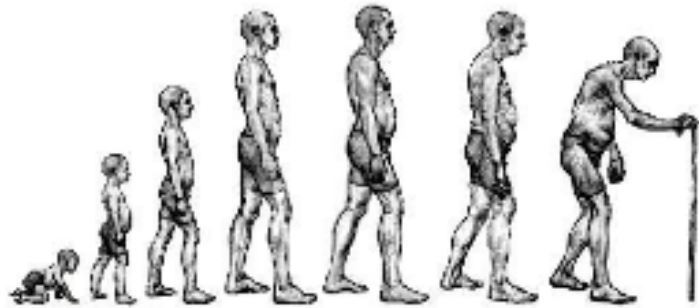
Prevalence of mental health disorders among 1027 women with HIV



Lifetime mental health comorbidities among 1027 women with HIV



Social Determinant Burden [‘multiple hits’] Across Life



increasing **burden of ongoing**

****Congenital**

childhood

adolescence

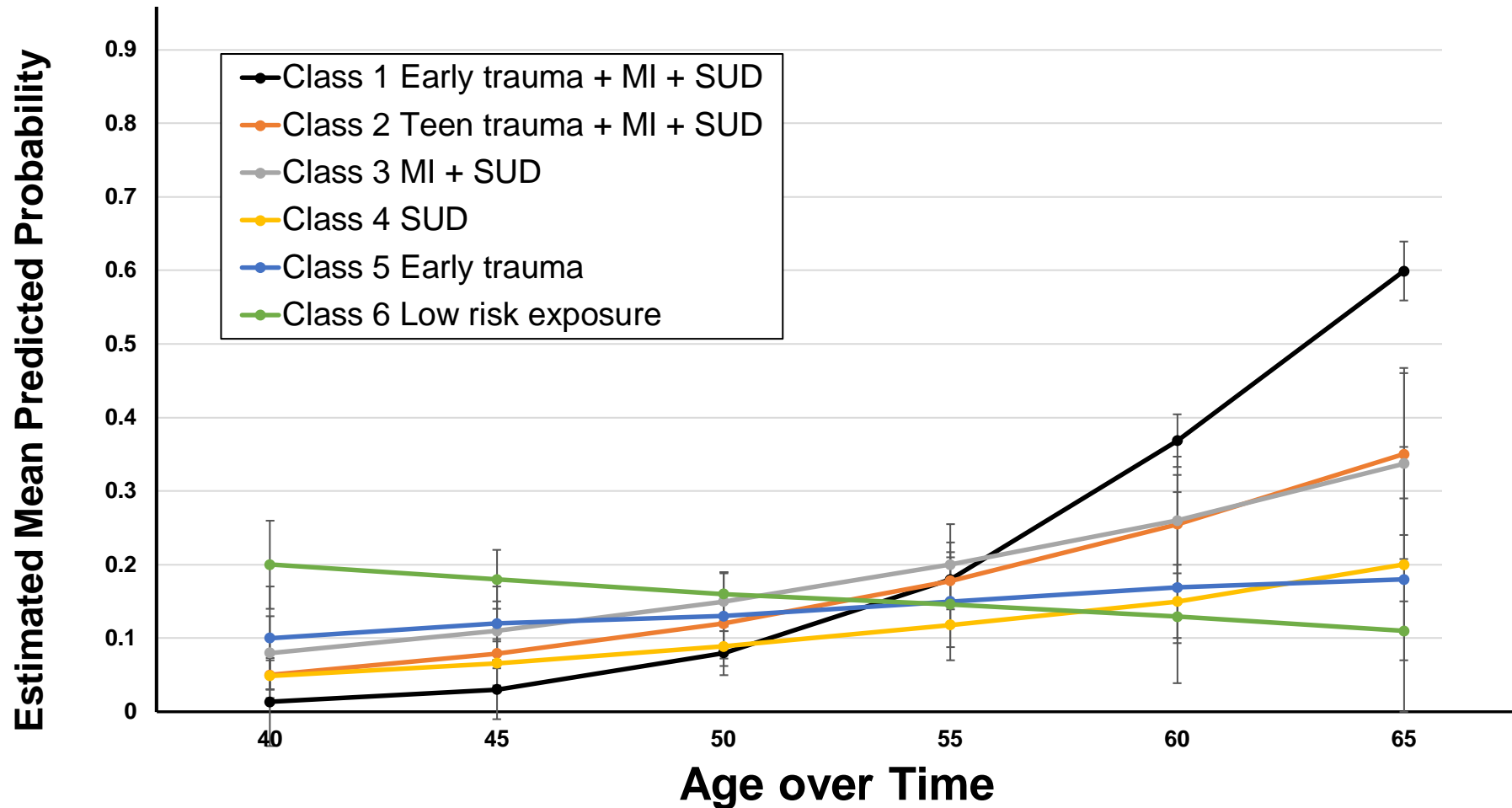
adulthood

*EDUCATION - TOXIN EXPOSURE - MALNUTRITION - NEGLECT - ABUSE
- POVERTY - TRAUMA - STIGMA - ADVERSE LIFE EVENTS -
HEALTH CARE*

Brain health

(e.g., ANXIETY, DEPRESSION, PTSD, COGNITIVE IMPAIRMENT)

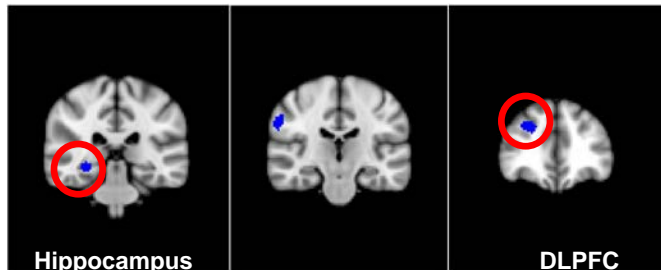
Early trauma, mental illness (MI), & lifetime substance use disorder (SUD) showed a greater likelihood of global cognitive impairment than the other groups



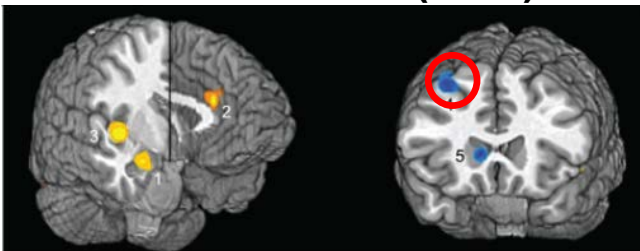
Models control for clinic site, income, education, and Hepatitis C antibody positive

Childhood trauma & mental health disorders negatively influence brain function

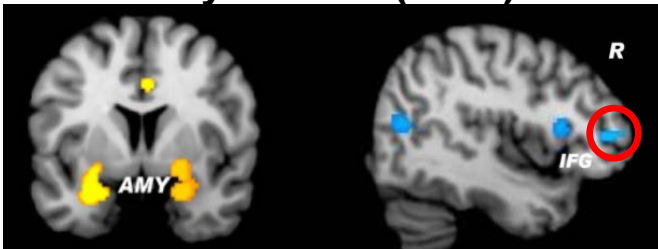
19 studies of **Childhood Trauma**,
Paquola et al. (2016)



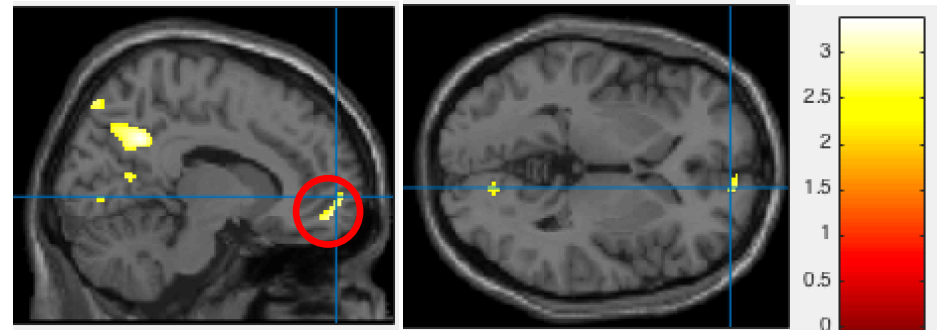
38 studies of **Depression**,
Hamilton et al. (2012)



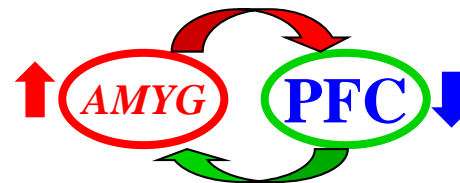
26 studies of **PTSD**,
Hayes et al. (2012)



High vs. low **stress (perceived or PTSD)** in
women with HIV during verbal recognition,
Rubin et al. (2016)



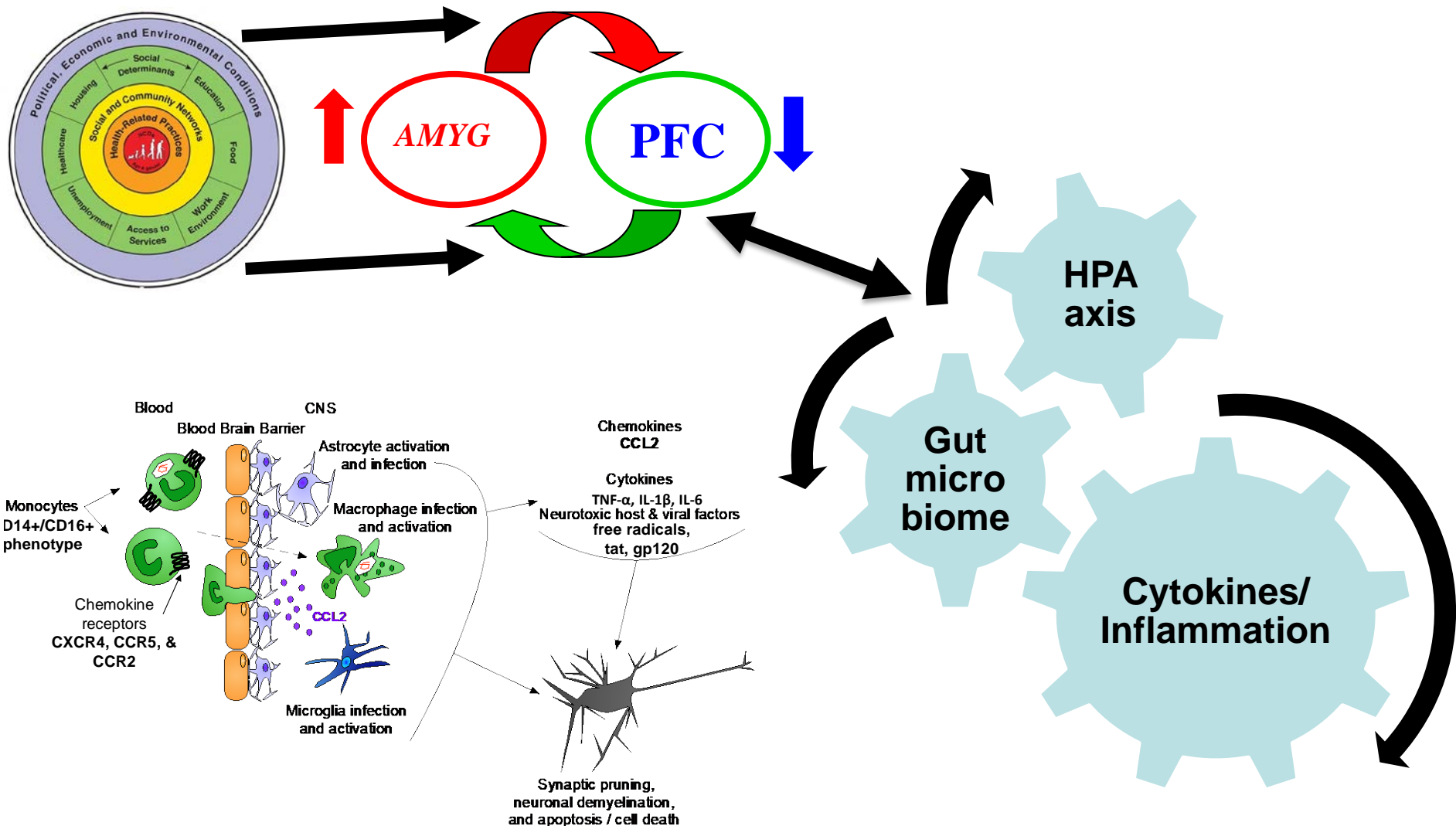
↑ deactivation right medial PFC



PFC

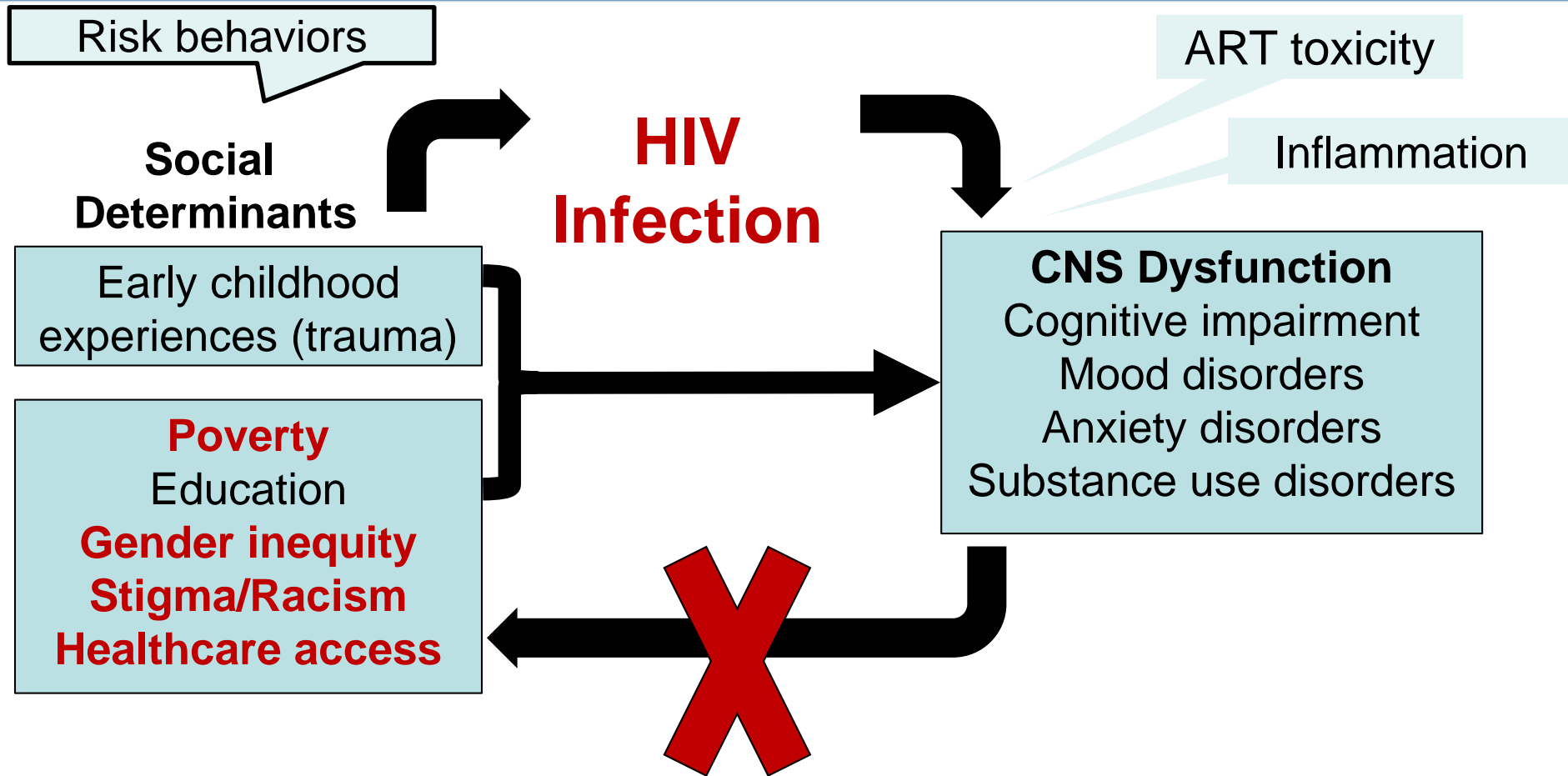
Holds data in mind
Updates 'news'
Allocates attention
Coordinates behavior
Guides thinking
Regulates Emotion

Biological instantiation of social determinants of health in HIV

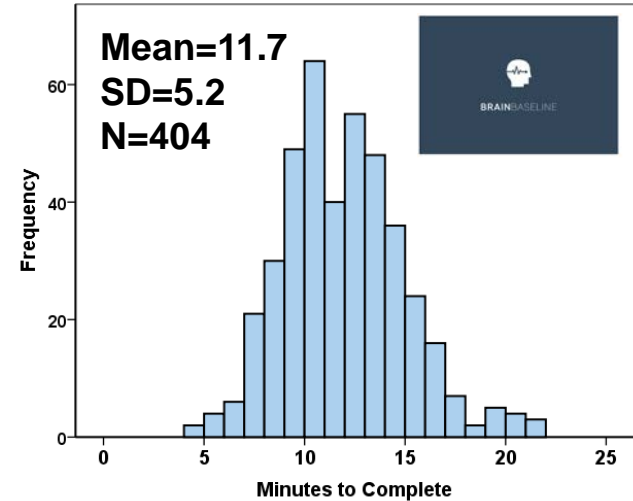
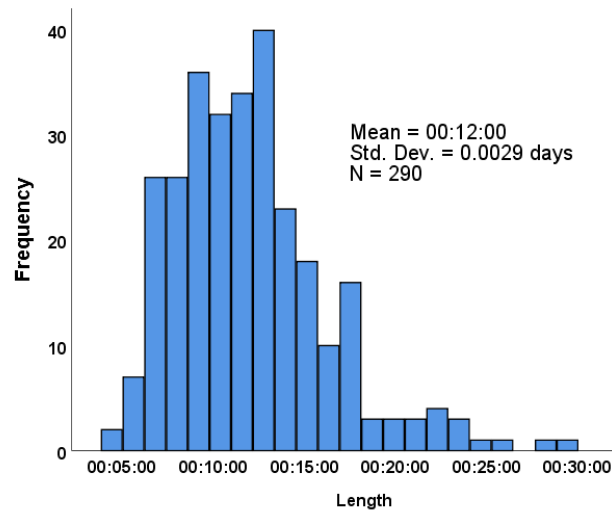


**HEALTH SYSTEM
REPOSE TO SOCIAL
DETERMINANTS OF
CNS DYSFUNCTION
IN PWH**

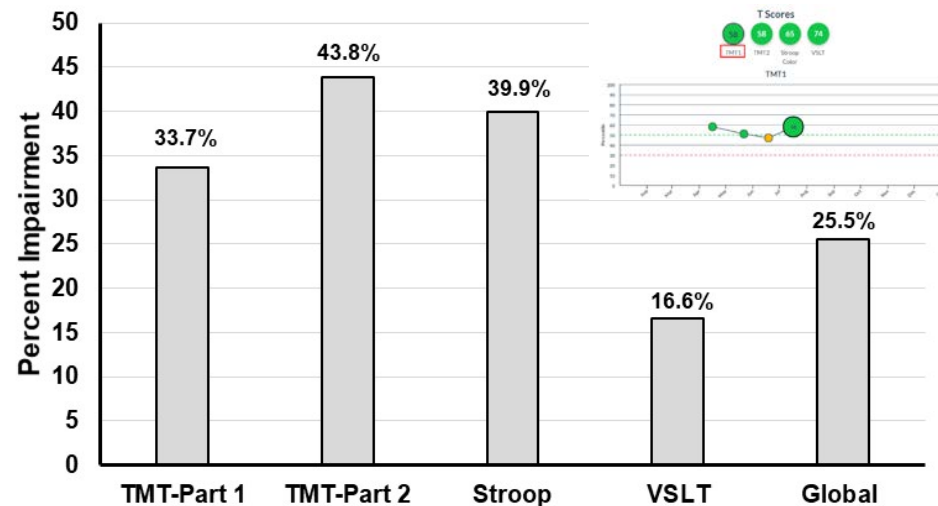
Conceptual Model



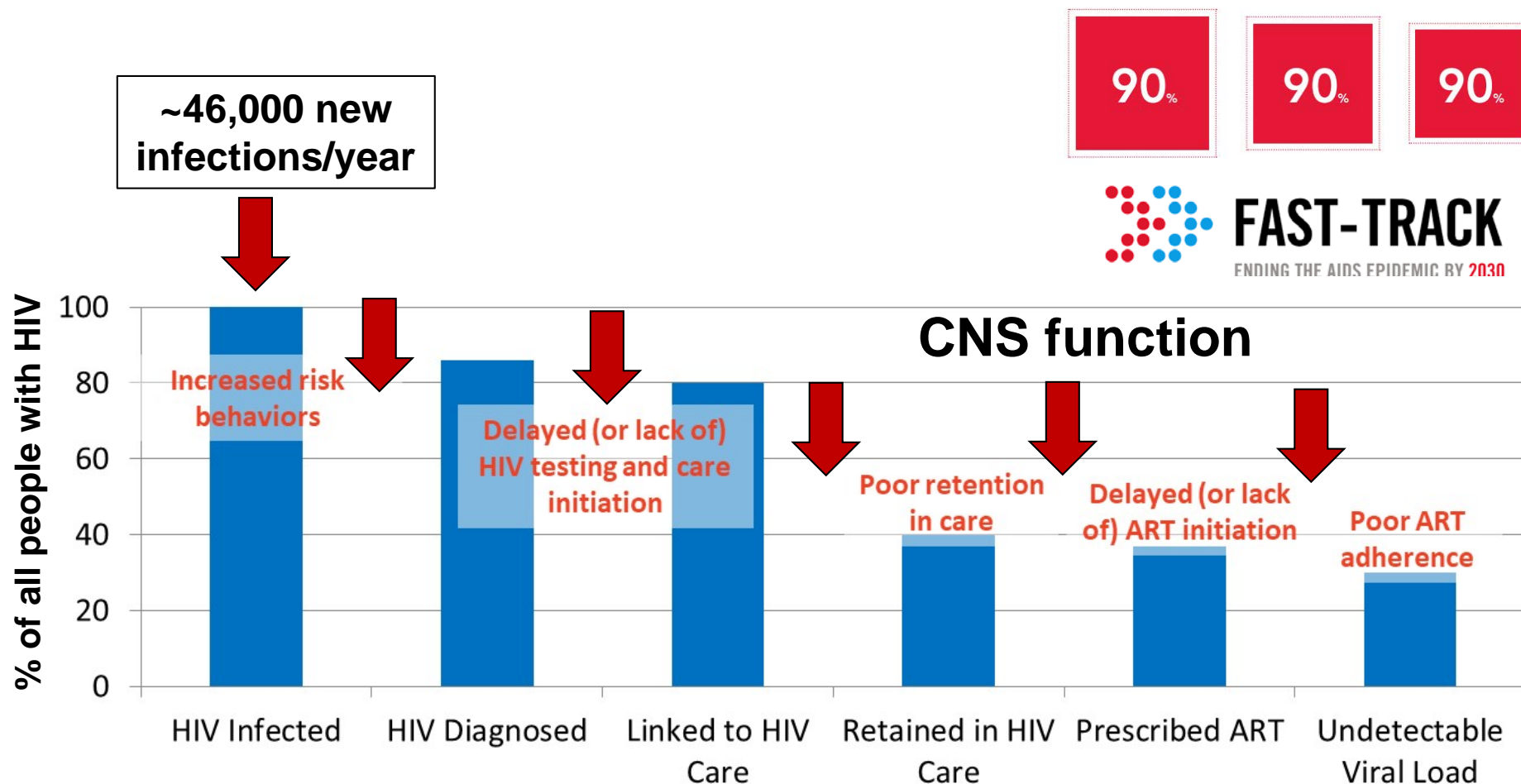
Integrating cognitive and mental health assessments into routine HIV outpatient clinical care



MH/SUD	n (%)
MDD	72 (25)
Mania	74 (25)
Anxiety	74 (25)
Suicidal	6 (2)
PTSD	34 (12)
Substance use disorder	76 (26)



Improving chronic disease outcomes through approaches that address social determinants of health





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of Health

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Digital Artefacts: Joan Severson  BrainBaseline

MACS/WIHS Combined Cohort Study

- Neuropsychological Working Group
- MACS/WIHS CCS participants

Community Organization Partners

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Falling through the cracks: the gaps between depression prevalence, diagnosis, treatment, & response in HIV care

