

How Does Trauma Change the Brain?



Dr. Kate Harkness, PhD, CPsych

Professor

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Research Interests: I study the ways in which childhood trauma and stress change the brain and raise risk for depression

Brain Health Wellness Tip: Take a hike! Getting active in nature releases chemicals in the brain that promote brain health and overall wellness.

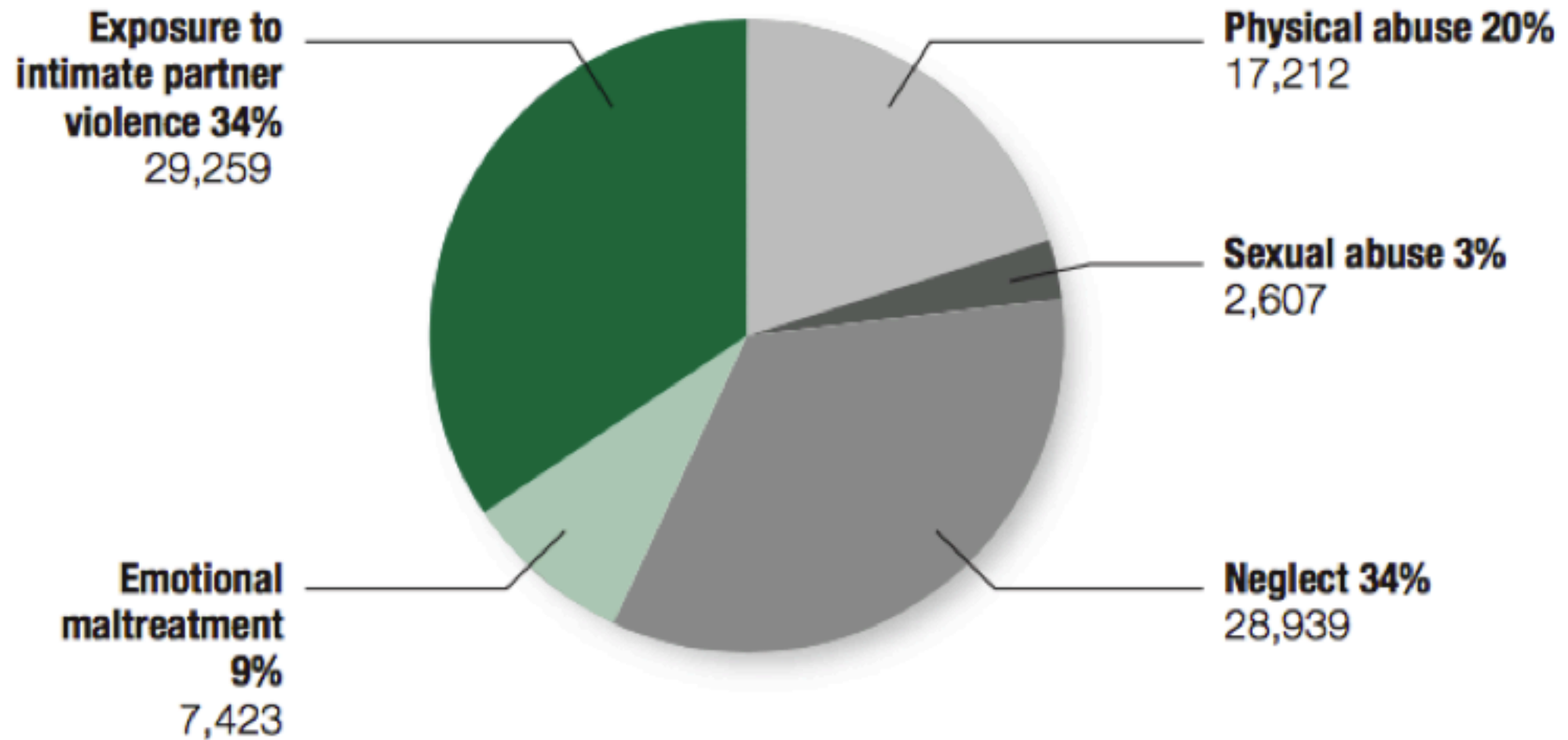


How Does Trauma Change the Brain?

Lessons from Neuroscience on the Effects of Trauma and How to Heal

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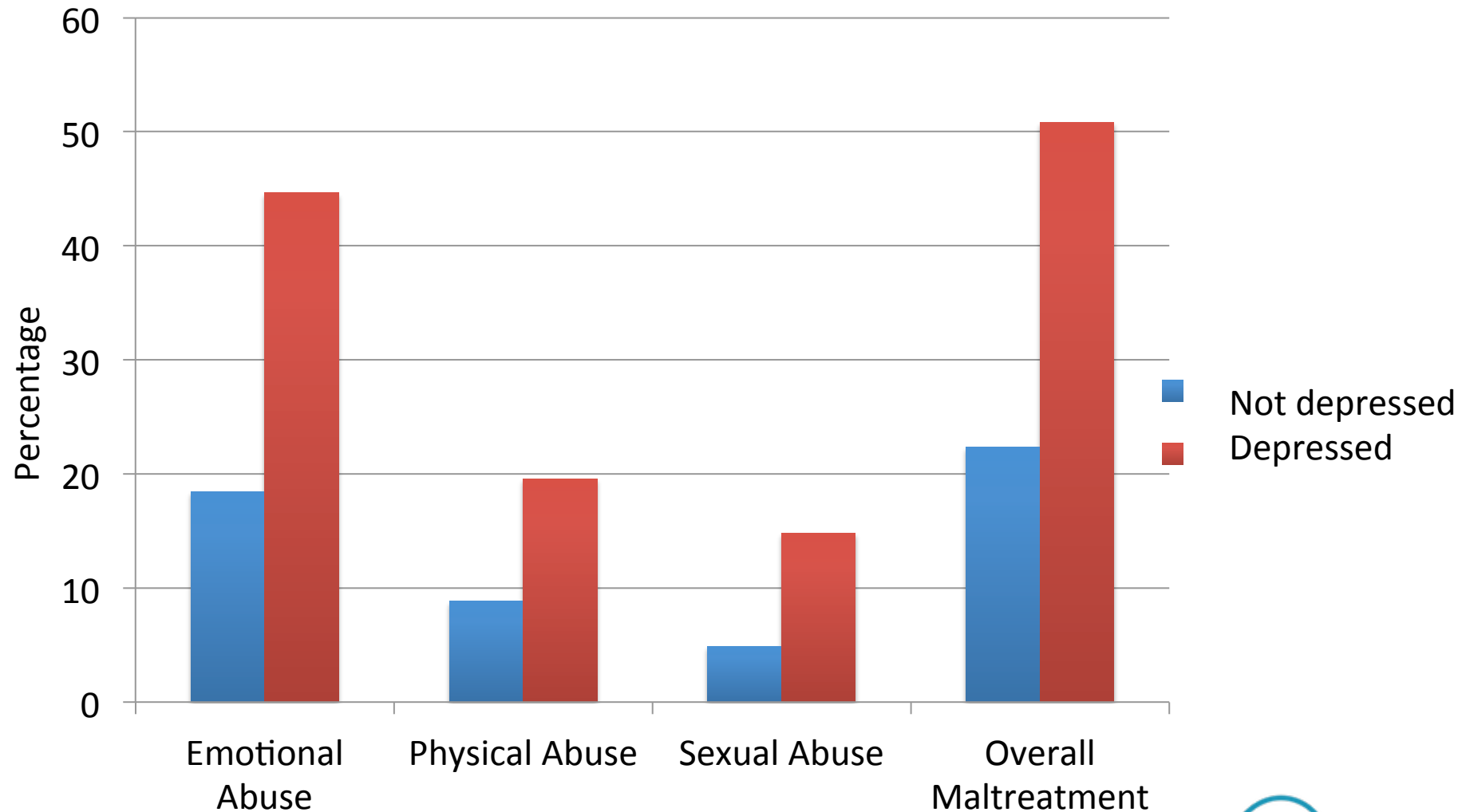
Rates of Substantiated Child Maltreatment Cases in Canada



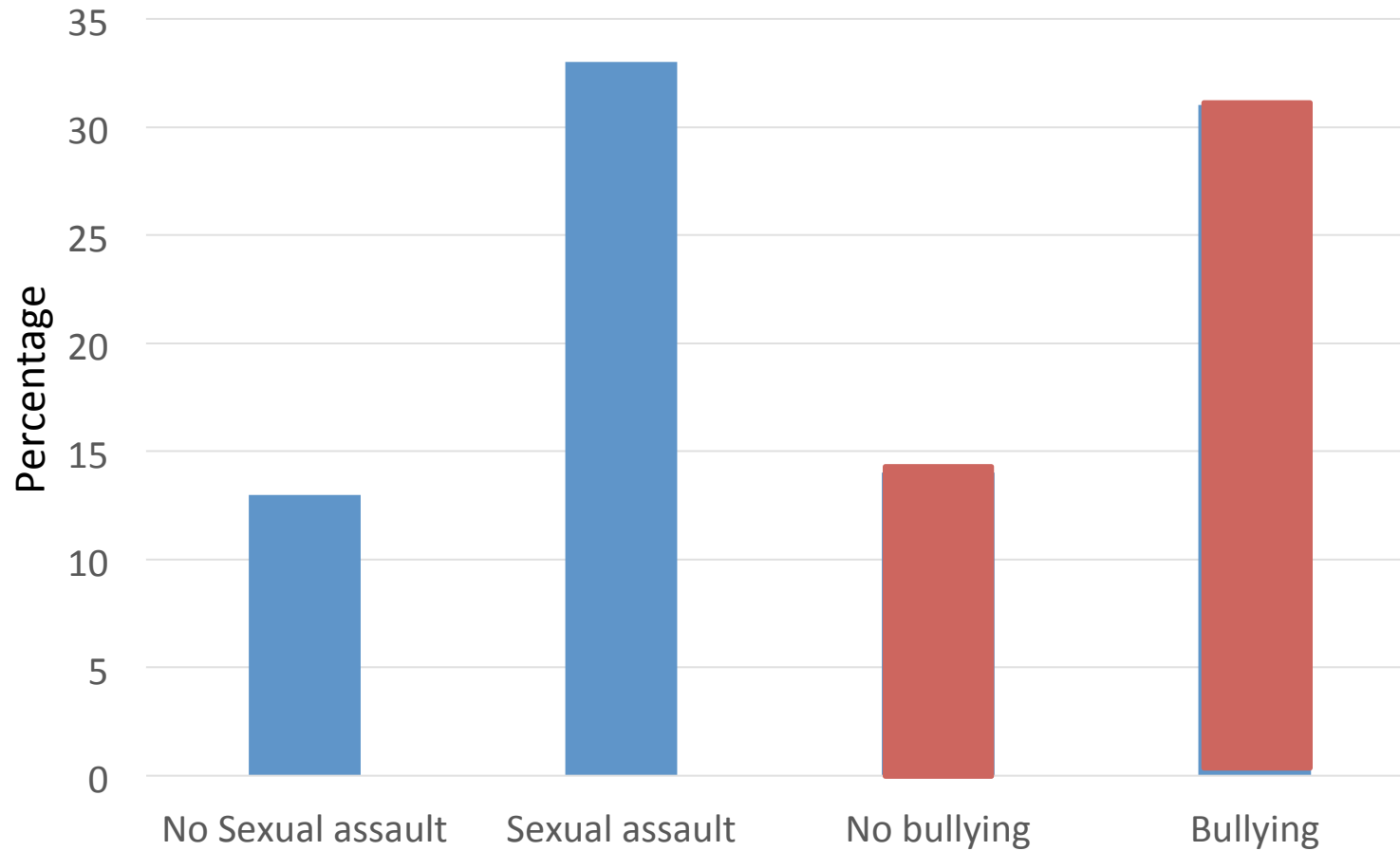
Child Maltreatment and Depression

Children who are victims of abuse in childhood are 2-5 times more likely to develop depression as teenagers or adults than children who are not abused.

Child Maltreatment and Depression in CAN-BIND

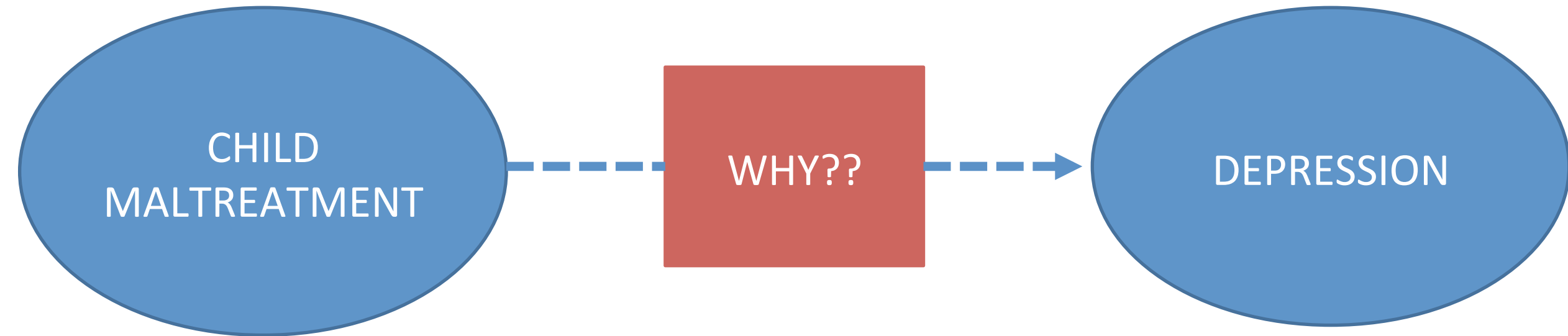


Child Emotional Maltreatment and Re-Victimization in Adolescence and Young Adulthood

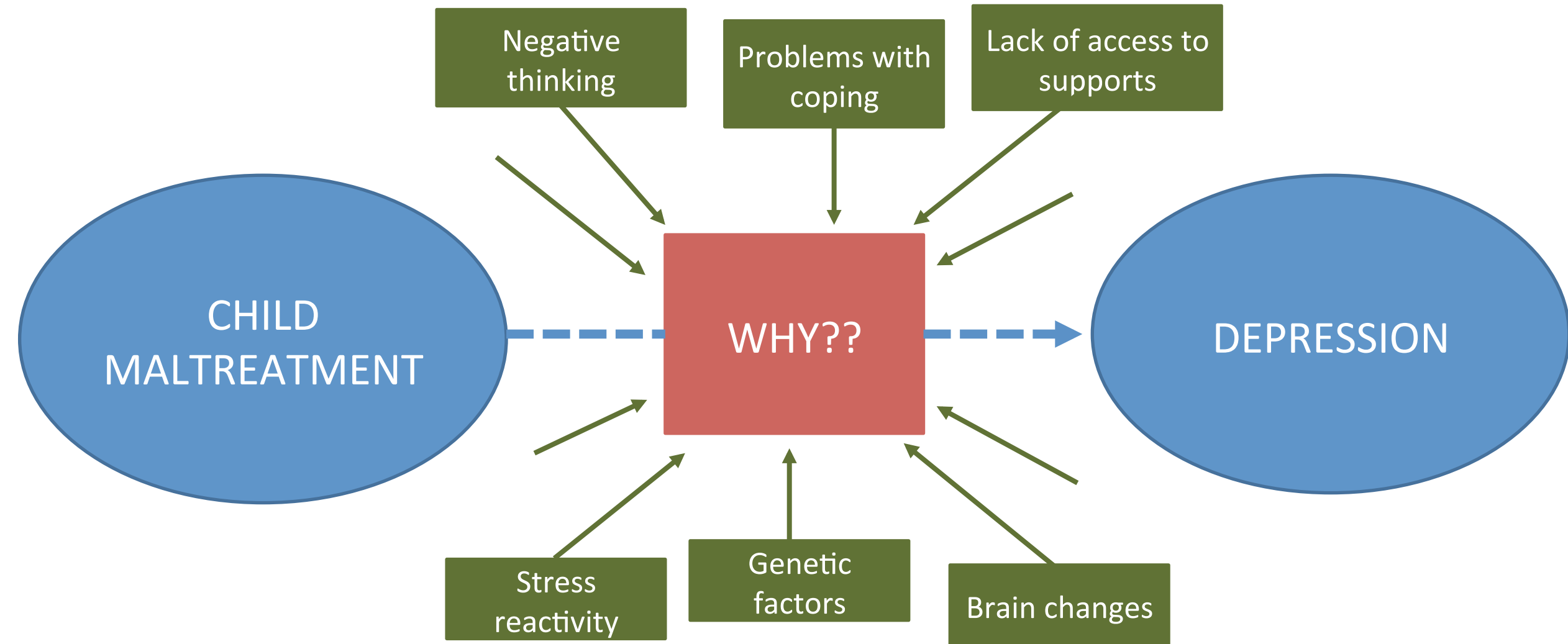


Cunningham et al. (2019)

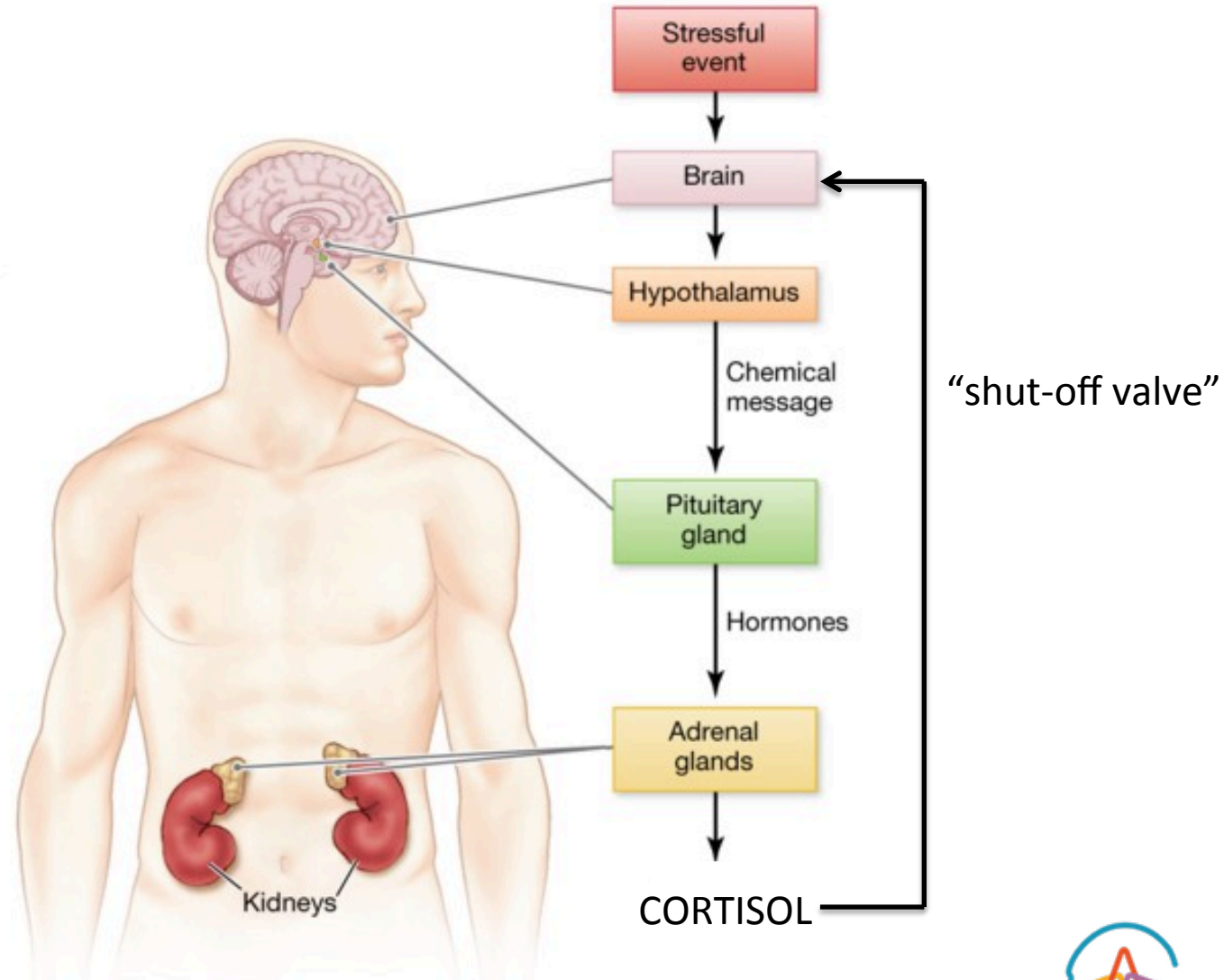
What are the Mechanisms?



What are the Mechanisms?



The Hypothalamic-Pituitary-Adrenal (HPA) Axis: “Fight/Flight”

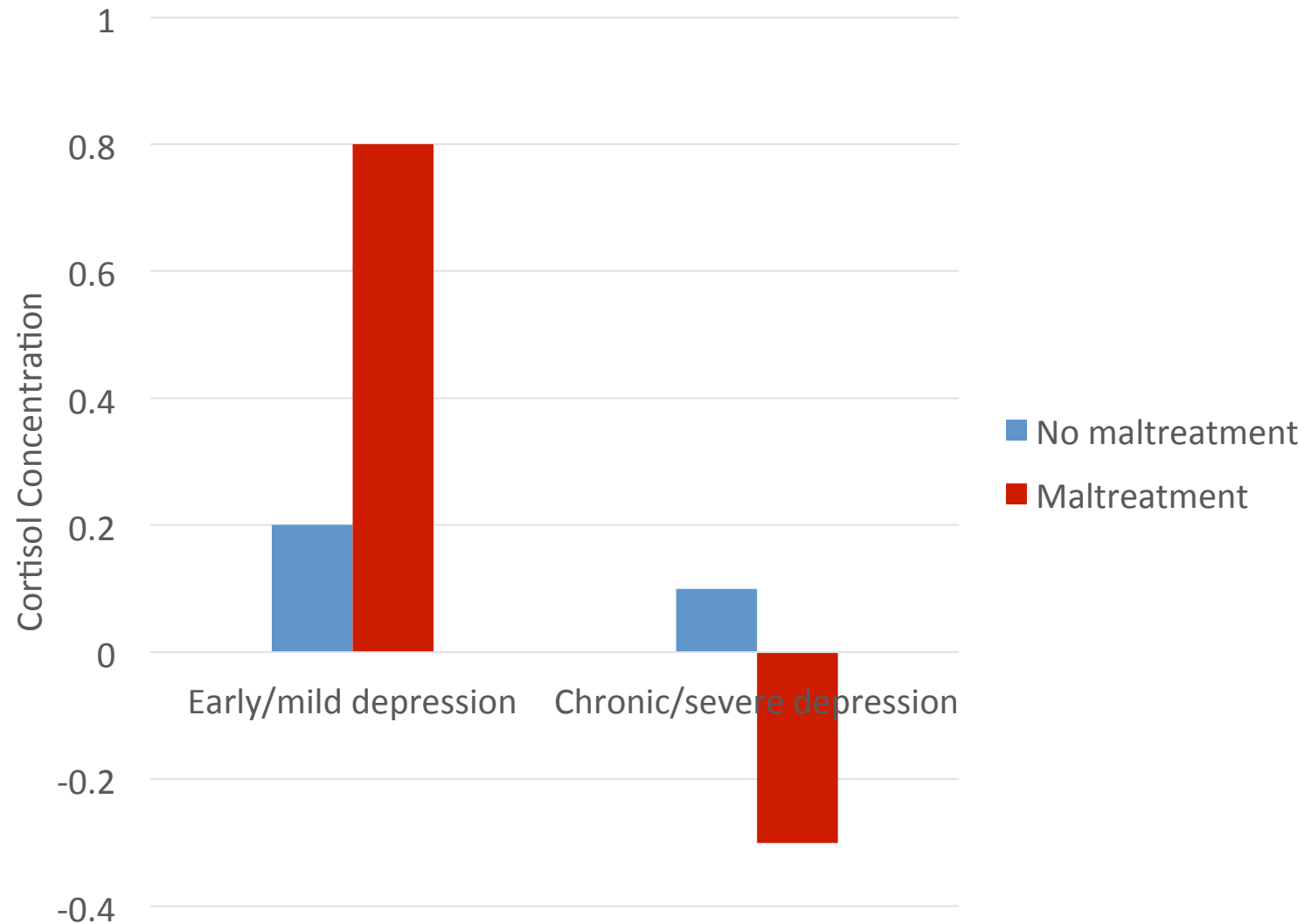






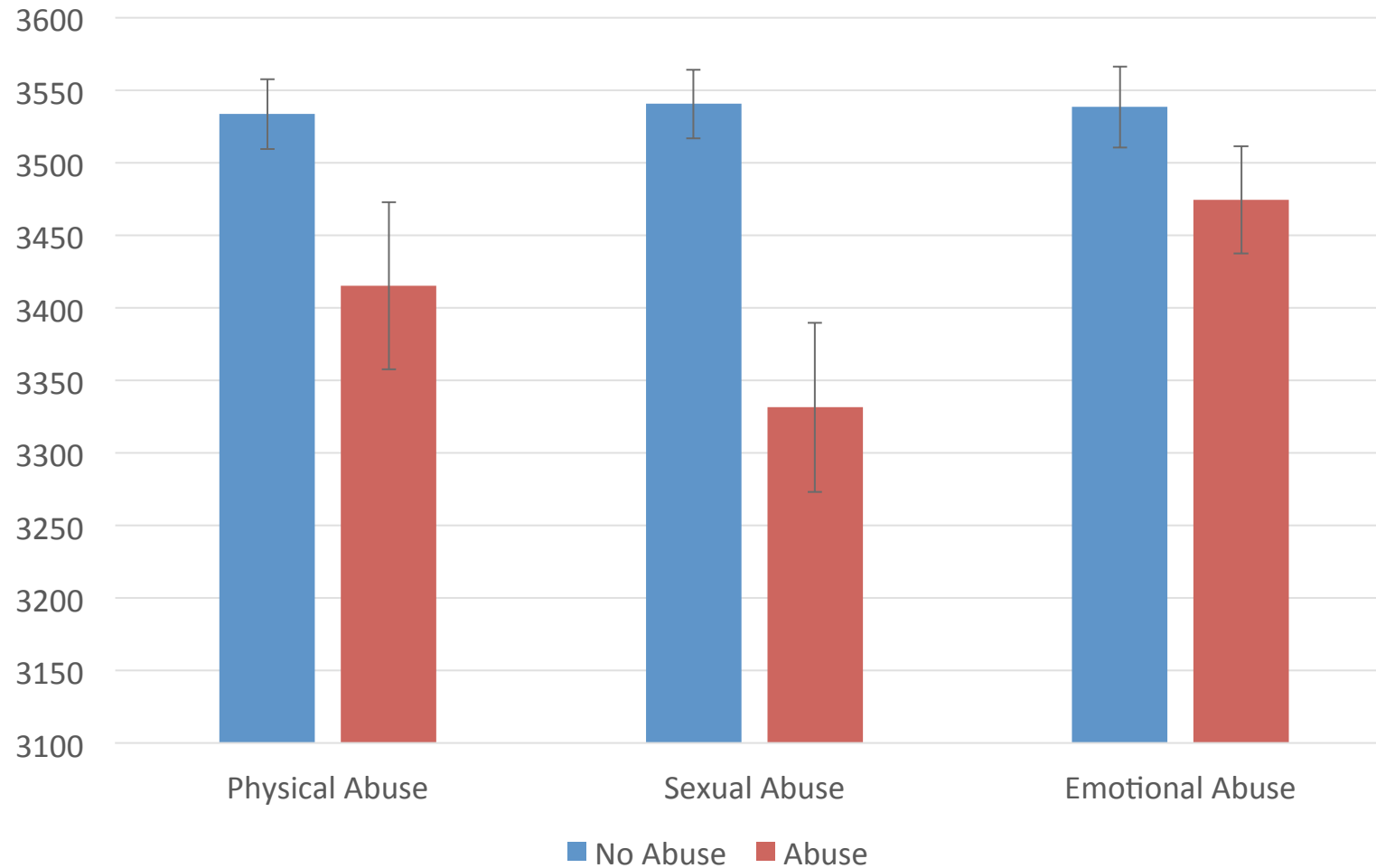


Child Maltreatment and Cortisol Response to Stress in Depression

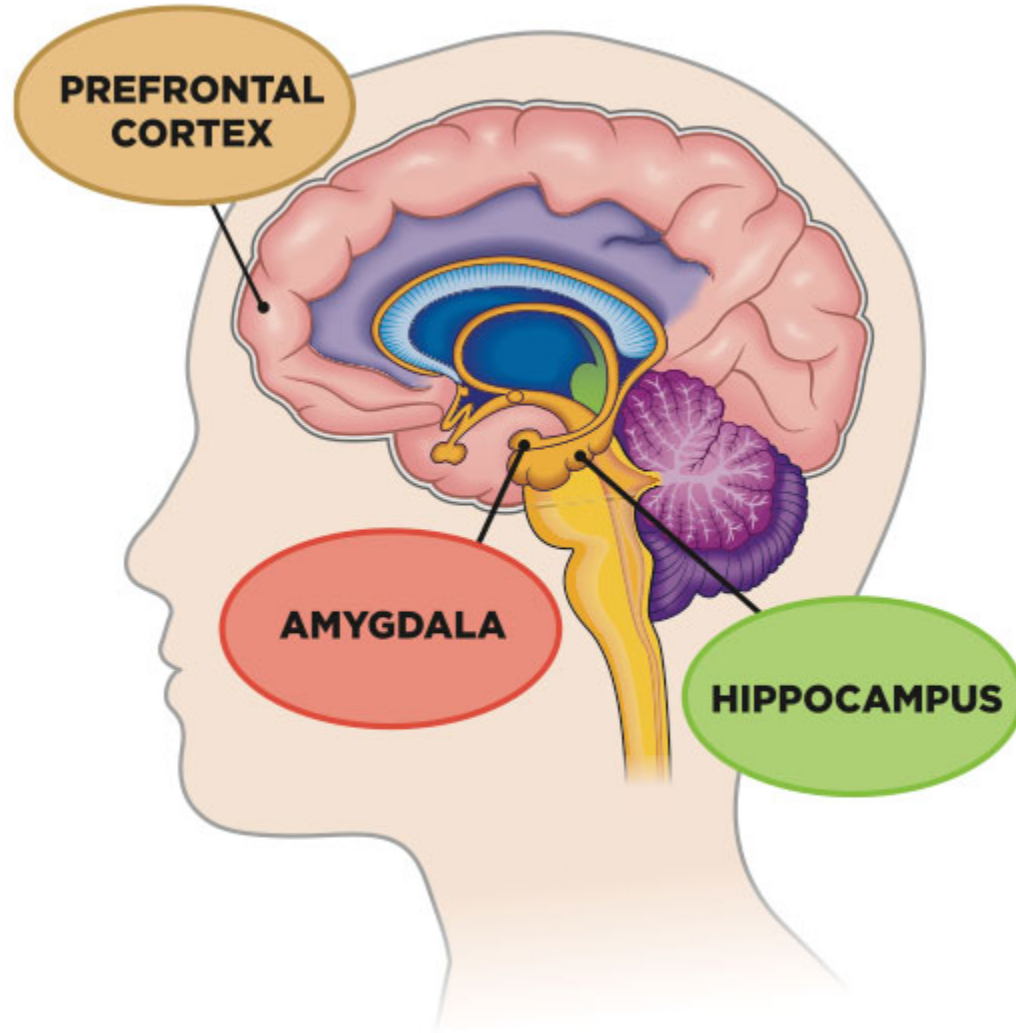


Harkness et al. (2011)

Volume (Size) of the Hippocampus



What does the Hippocampus do?

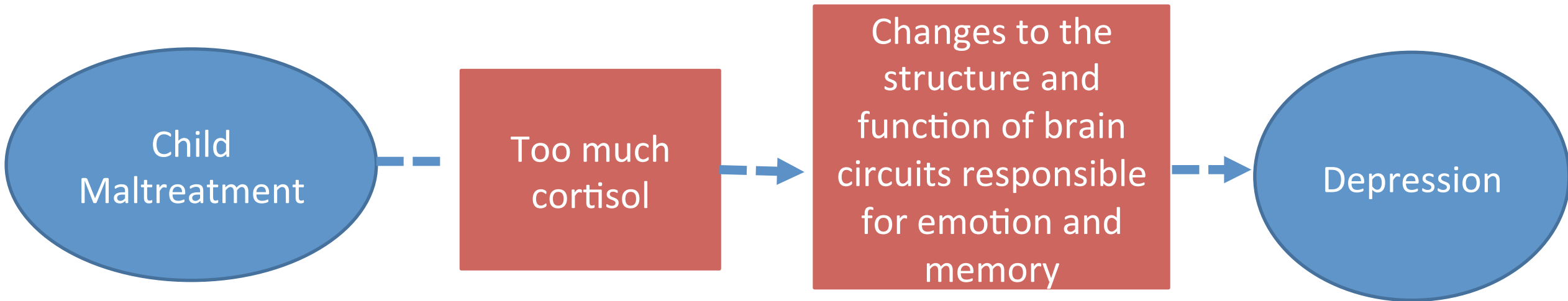


Hippocampus: long-term memory (especially emotional memory)

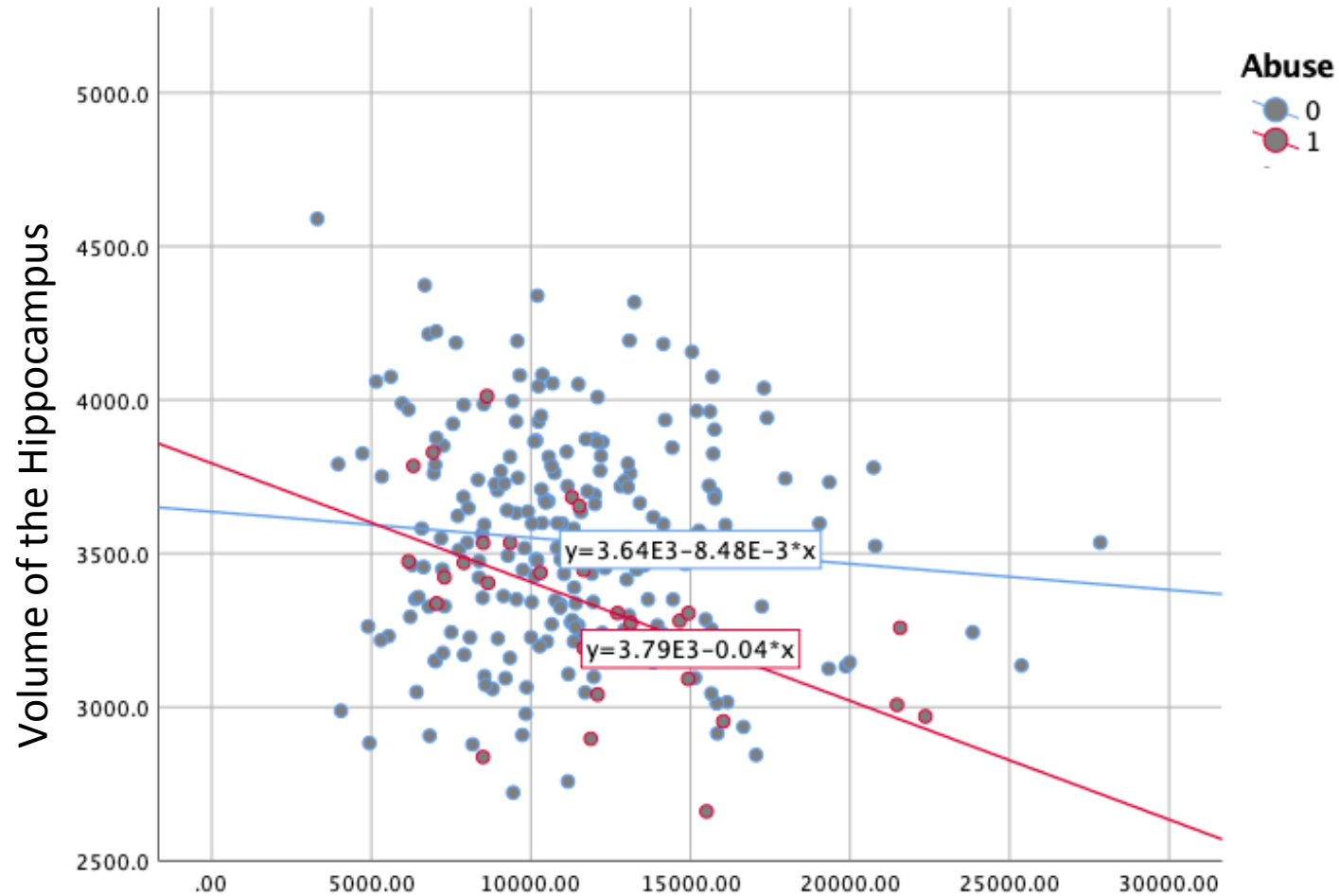
Amygdala: emotion regulation, perception of fear/stress

Prefrontal cortex: Planning, decision making, personality expression, social behaviour

WHY? One Brain Mechanism



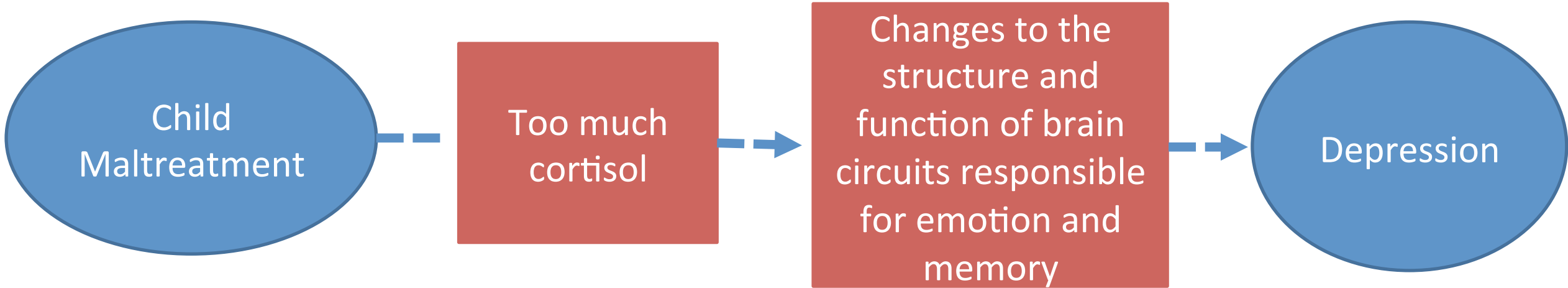
For Whom? Genetic Risk



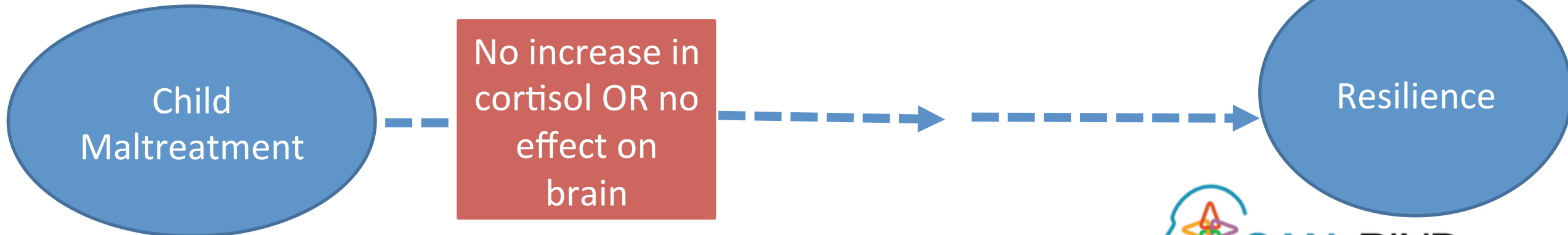
Expression of a Gene that Heightens Effects of Cortisol

WHY and FOR WHOM?

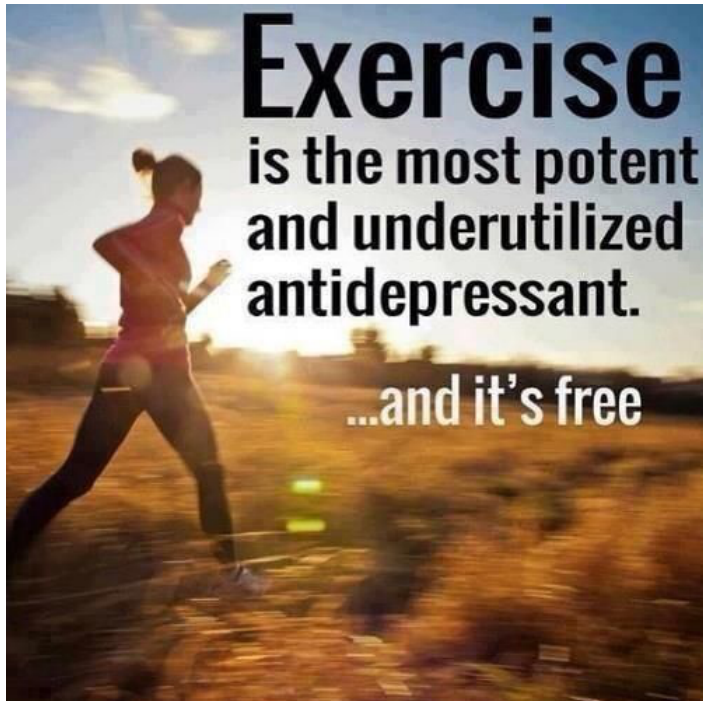
High Genetic Risk



Low Genetic Risk



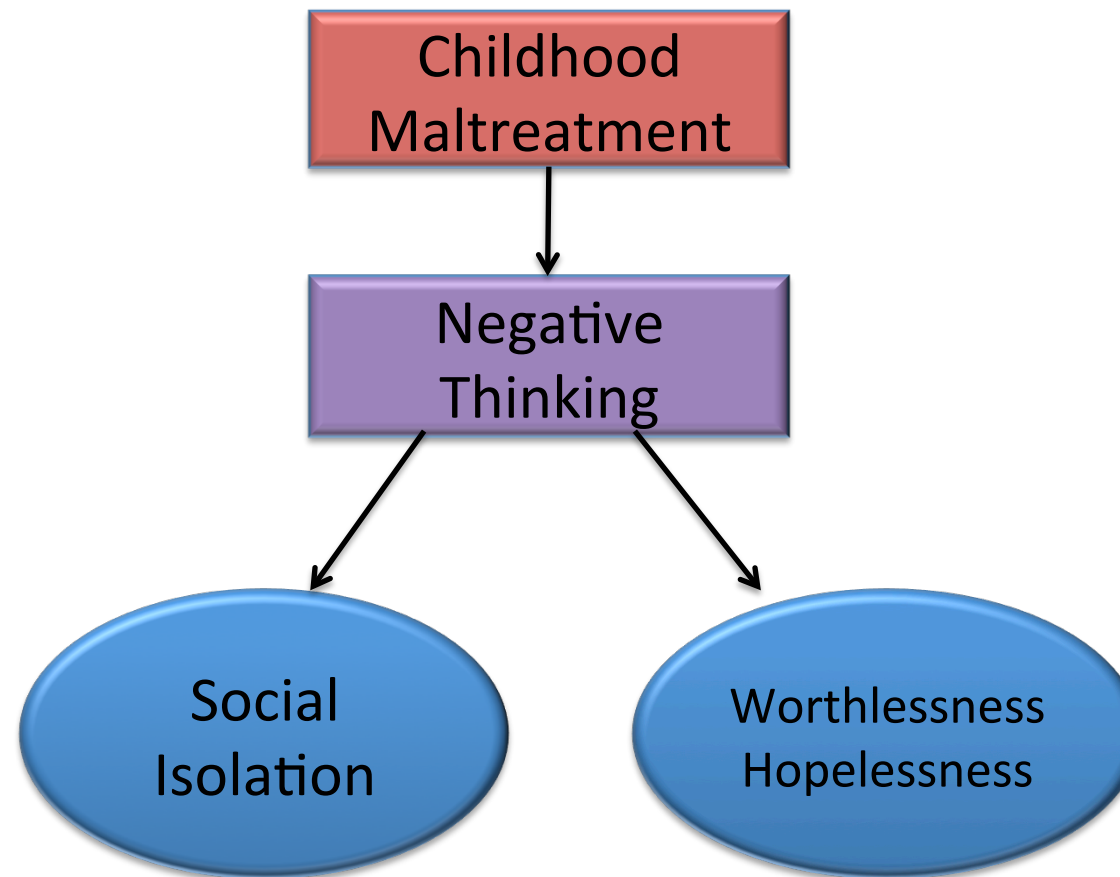
Preventing Depression in those with a History of Maltreatment Through a More Adaptive Response to Stress



Mind Full, or Mindful?

Treating Depression by Challenging Negative Thinking and Activating Behaviour

Trauma-Focused Cognitive Behavioural Therapy



Developing Novel Biological Treatments

- Medications that target neurochemicals in the biological stress system (anti-inflammatories)
- Medications that target neurochemicals in the reward system (dopamine)

Take-Aways

- Childhood maltreatment raises risk of developing depression in the teenage and adult years.
- It does so by causing too much release of stress hormones. This can then change brain areas responsible for emotion and thinking.
- Prevention strategies should focus on stress reduction. New treatments are being developed specifically for depressed people with traumatic histories.
- <https://www.ementalhealth.ca> [search term 'trauma']

Universities

- Dalhousie University
- McGill University
- McMaster University
- Queen's University
- Simon Fraser University
- University of British Columbia
- University of Calgary
- University of Guelph
- University of Ottawa
- University of Michigan
- University of Toronto

Health Science Centres

- Centre for Addiction and Mental Health
- Douglas Mental Health University Institute
- Hotchkiss Brain Institute & Mathison Centre for Mental Health Research and Education
- Providence Care & Kingston Health Sciences Centre
- Queen Elizabeth II Health Sciences Centre
- Rotman Research Institute, Baycrest
- Royal Ottawa Institute of Mental Health Research
- St. Michael's Hospital & Li Ka Shing Knowledge Institute
- St. Joseph's Healthcare Hamilton
- Sunnybrook Research Institute
- University Health Network & Krembil Research Institute
- Vancouver Coastal Health Research Institute

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Major Granting Agencies and Industry Partners



Additional Partners and Support