



## Shared Factors for Co-Occurring Eating Disorders and Substance Use Disorders - Neurobiology, Trauma and Attachment

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## Neurobiology: The Brain



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## The brain has plasticity but this is most available in younger ages

Neurodevelopment involves billions of interactions across multiple domains: multiple micro (synapse), macro domains (maternal-child interactions).

These result in the dynamic expression of our genetic potential and the organization of nerve cells and synapses that make up the human brain. Maltreatment disrupts this process.

Trauma, neglect and other experiences of maltreatment (prenatal exposure to drugs or alcohol) or impaired early bonding all influence the human brain.

Bruce Perry 2009

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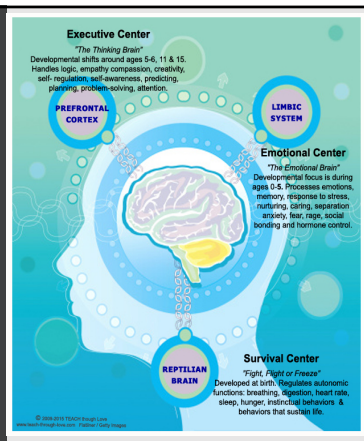
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### Brain Development

- Brain development is bottom up
- The organization of higher brain depends on input from the lower brain
- Dopamine, Norepinephrine and serotonin "over all"



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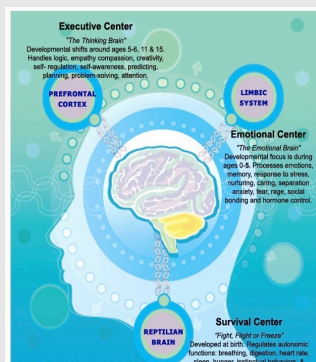
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## The Developing Brain

- Timing is everything
- Norepinephrine systems
- Model of brain recovery after stroke can be used for brain recovery after SUD



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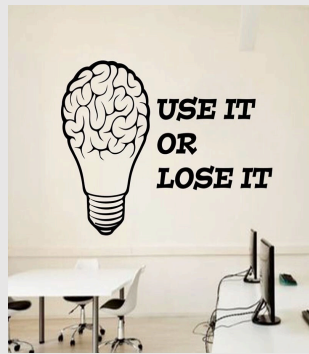
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- Experience molds the developing brain
- ACE's disrupt neurodevelopment which leads to compromised functioning
  - Perry BD 2002




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When there is a threat to a child that is prolonged and repetitive

The brain undergoes "use-dependent" changes  
This affects norepinephrine



Changes the brain's response to stress



Brain will reset acting as if it is under constant and present threat

(Perry & Pollard, 1998; Hambrick et al. 2019).

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Perry BD, 2009

Childhood Neglect – a different problem




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Kids are like sponges



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## Factors



ACES AND  
THE BRAIN



ATTACHMEN  
T DISORDERS



GENETICS



PERSONALITY



CULTURE  
AND MEDIA



NUTRITION  
AND BRAIN



ACTIVATION  
OF THE  
STRESS  
RESPONSE



SLEEP  
DISRUPTION

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It's not about the  
substance

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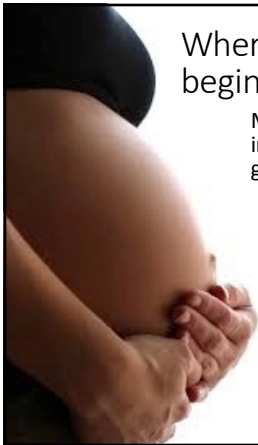
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Where does the problem  
begin?

Mother's behaviors have  
important effects on the brain's  
growth and development

- Prenatal nutrition
- Prenatal Stress
- Attachment
- Stress in infancy, childhood
  - Schwarzenberg, 2018
  - Nosarti et al., 2019



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Nutrition is key in first 1000 days

- The brain is most vulnerable from the last trimester of pregnancy to the first two years of life.
- Gestational nutrition is associated with neurodevelopment for single nutrients: iron, omega 3 fatty acids and folate
- The diet of pregnant women, infants and children has lasting effects throughout the lifetime



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### Genetics

- Neglect, from a neurodevelopmental perspective, is the absence of the necessary timing, frequency, pattern, and nature of experience (and the patterns of neural activation caused by these experiences) required to express the genetic potential of a core capability (e.g., self-regulation, speech and language, capacity for healthy relational interactions).
- **Hardiness, resilience, sensitivity**
- **Genetics affect attachment styles**

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### Nutrient Deficiencies and SUD

- Alcohol can account for 50% of dietary caloric intake
- Vitamin deficiencies
  - Thiamine
  - Folate, other B-vitamins
  - Vitamin C, K, A
  - Calcium, Phosphorus
  - Vitamin D
  - Magnesium
- Poor digestion /absorption of nutrients due to GI complications
- If alcohol intake > 25% there is significant decrease in:
  - Carbohydrates
  - Protein
  - Fat and vitamins

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### ASAM Definition of Addiction

Addiction is a primary, **chronic disease of brain reward, motivation, memory and related circuitry**. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviours.

Addiction is characterized **by inability** to consistently abstain, impairment in behavioural control, craving, diminished recognition of significant problems with one's behaviours and interpersonal relationships, and a dysfunctional emotional response.

Like other chronic diseases, addiction **often involves cycles of relapse and remission**. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death."

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## Case



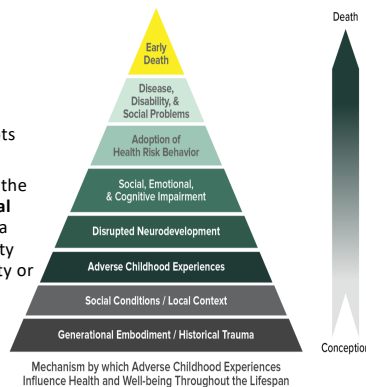
## Development of the Human Brain

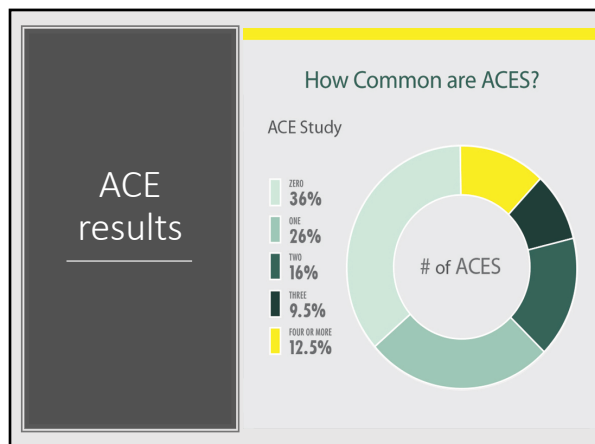
- Reward center of brain has two functions:
  - Judgment, thinking, executive function = Prefrontal cortex
  - Emotion, memory, impulsivity = Limbic
- Child's brain is more malleable to experience than mature brain (plasticity) – GOOD OR BAD EXPERIENCES
- Timing of adverse childhood experiences makes a difference (before age three)
- Neglect in childhood affects brain development.
  - For example, a ten-year-old child may have the speech and language skills of an eight-year-old, the social skills of a four-year-old and the emotion regulation skills of a toddler.

## Trauma

- Addiction has its' roots in childhood trauma
- Trauma is defined as the **loss of some essential part of yourself**, like a sense of peace, vitality or presence. (or safety or trust)

Gabor Mate'






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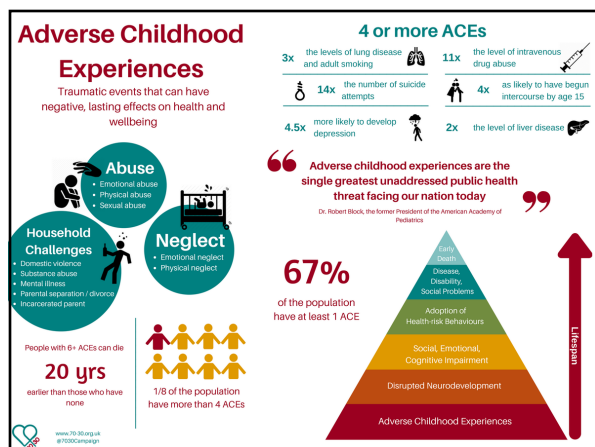
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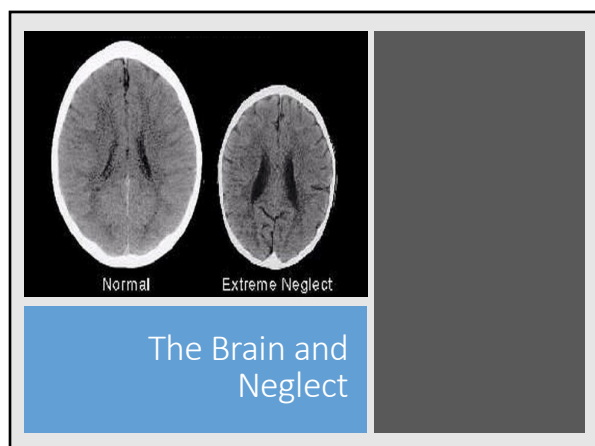
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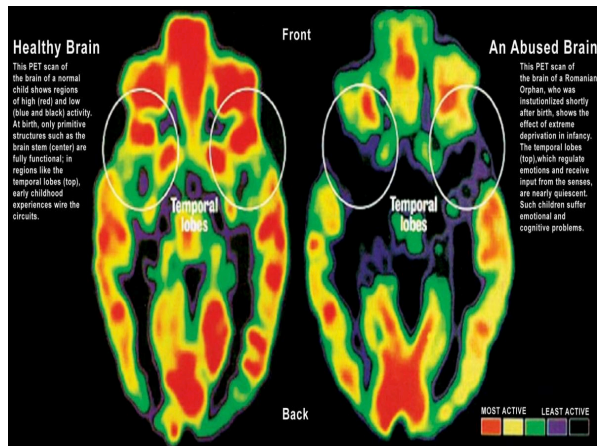
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## Trauma and the Brain

“.....the impact of trauma is upon the survival or animal part of the brain. That means that our automatic danger signals are disturbed, and we become hyper- or hypo-active: aroused or numbed out. We become like frightened animals. We cannot reason ourselves out of being frightened or upset.

Of course, talking can be very helpful in acknowledging the reality about what's happened and how it's affected you, but talking about it doesn't put it behind you because it doesn't go deep enough into the survival brain.”

Van der Kolk [www.psychotherapy.net/interview/bessel-van-der-kolk-trauma](http://www.psychotherapy.net/interview/bessel-van-der-kolk-trauma)

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## Australia and childhood trauma

- Research has linked trauma and the need for trauma-informed care into its schools
- Strategies for managing abuse related trauma (SMART) - an online training
  - Studies show a reduction in violent incidences and student suspensions
    - Australian Childhood Foundation, 2011
    - Rosenman and Rogers 2004

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## Worldwide

- Increase childhood trauma in countries with low per capita income
- Survey of Eastern European Countries
  - Over 50% had at least 1 ACE
    - Physical abuse was the most commonly reported
    - 7.5% with sexual abuse
  - All types of adverse childhood experience were significantly associated with smoking, the problematic use of alcohol and drug abuse
  - significant association between adverse childhood experiences and health-harming behaviours of young adults
- in England between 2009 and 2010, there were 62 child maltreatment fatalities and 43 700 child maltreatment cases substantiated through child protection data.
  - WHO

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## Risks and Protective Factors

- Severity of the event
- Proximity to the event
- Caregivers reaction
- Prior history of trauma
- Family and community factors

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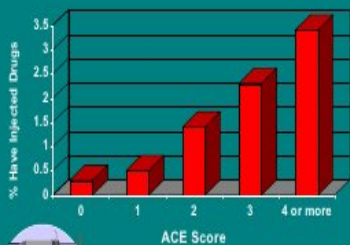
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### ACE Score and Intravenous Drug Use



N = 8,022 p < 0.001

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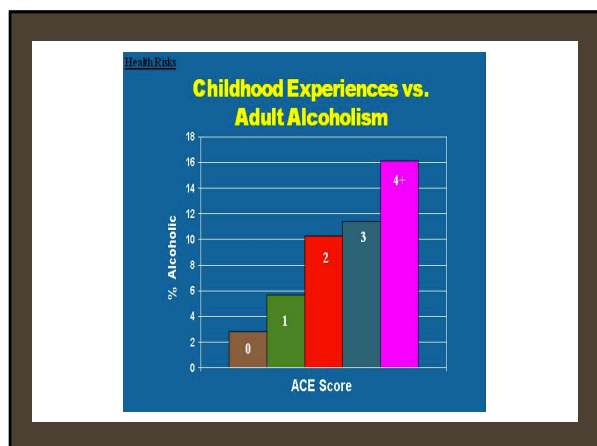
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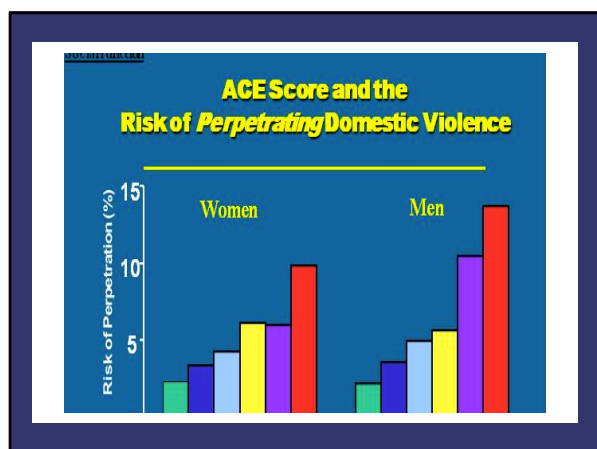
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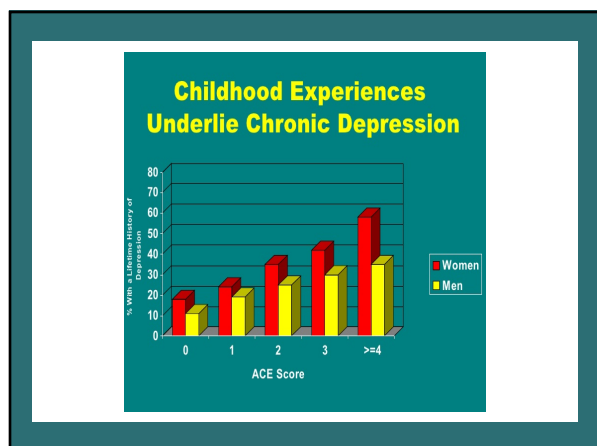
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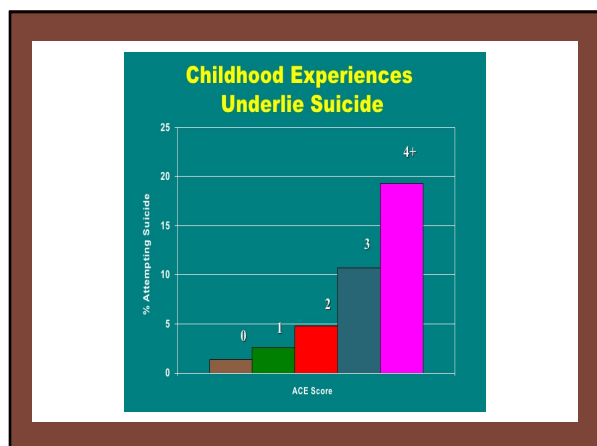
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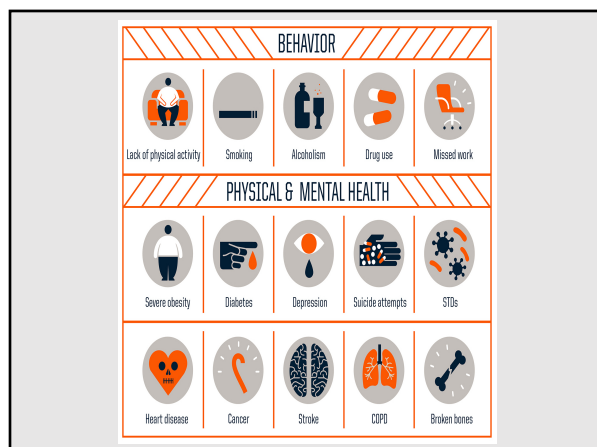
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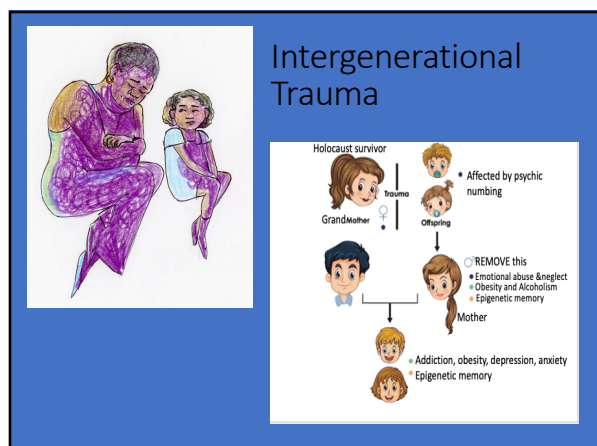
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### Abuse, neglect, trauma and the brain

**Hyperactive stress response results from insecure attachment and from ACEs**

**Brain development is altered by ACEs → dysfunctional and chaotic organization**

**Lower brain functions govern eating, self-soothing, self-harm**

Use food, self-harm, etc. to regulate the lower brain (norepi, dopamine, serotonin) stress response and to self-soothe

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“The trauma is not the story of what happened long ago; the long-term trauma is that you are robbed of feeling fully alive and in charge of your self.”

Bessel Van der Kolk

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## SUD and Trauma

- Farley et al. (2004) – **89% of clients seeking treatment for SUD** had at least one traumatic experience:
- Gielen et al. (2012) – found **significantly higher trauma and PTSD in individuals with SUD** vs. those without. Clinicians did not often recognize or screen for trauma
- **Prevalence of PTSD in SUD clients is 3 X higher** than in gen pop (25-49% (Driessen et al., [2008](#)))
- **Poorer outcomes in SUD if PTSD is left untreated** (Mills et al. [2005](#))

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Childhood trauma in a community sample of women with SUD

60 % with sexual abuse

55% with physical abuse

46% with emotional abuse

83% were emotionally neglected

59% were physically neglected

Madrano MA, et al. 1999

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## Trauma and SUD

### PTSD plus SUD:

- Poorer outcomes
- Increased physical health problems
- Poorer social functioning
- Higher rates of suicide attempts
- More legal problems
- Increased risk of violence
- Worse treatment adherence
- Less improvement during treatment

[Jenna L McCauley](#) et al. (2013)

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## Trauma and SUD

- People with PTSD were 2-4 times more likely than someone without PTSD to have SUD
- In treatment seeking populations, those with PTSD were up to **14 times more likely to have SUD** compared to those without PTSD
- **Conversely in individuals seeking treatment for SUD, lifetimes PTSD rates were 30-60%**

*Which comes first PTSD or SUD?*

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## Cross-Addiction

- Gadalla and Piran (2008) found that women with either an SUD or an ED were more than four times as likely to develop the *other* disorder as were women who had neither disorder
- Gilchrist and colleagues (2007) examined the co-occurrence of EDs and SUDs and reported that 14 percent of women with an SUD had AN and 14 percent had BN

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## Cross-Addiction

Piran and Robinson (2006) looked at the relationship between EDs and SUDs and found that:

1. As EDs became more severe, the number of different substances used increased
2. Severe BED was consistently associated with alcohol use
3. Attempts to lose weight by purging (with or without binge eating) were associated with stimulant/ amphetamine and sleeping pill (e.g., triazolam, flurazepam) abuse

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## Other early brain insults

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## Case



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## Attachment Issues



- **Attachment insecurity** mediates the relationship between childhood trauma and eating disorder and addiction psychopathology (Tasca, et al., 2013)
- **Toxic shame** – a critic who tells you you're bad and the child in you who believes it

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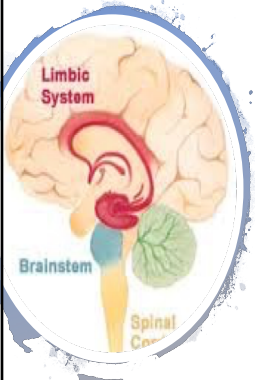
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## Attachment and the Brain

- Changes the range of neurotransmitters related to stress coping and emotional regulation
- Lack of variability in response to change
- Affects the limbic system re: stress coping

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## Attachment and Substance Use Disorders

- Insecurely attached individuals engage in more substance use than those with secure attachments
- Insecure attachment precedes substance use and endures throughout the lifespan
- Early attachment style predicts later changes in substance use more than substance use predicts later changes in attachment style
  - [\(Burkett & Young, 2017; Insel, 2003\)](#).
  - [Fairbairn CE, et al. 2018](#)

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## Attachment and ED



Attachment styles and sensitivity to media images



Insecure attachment is associated with destructive coping mechanisms (binging, restricting) and negative body image



More easily overwhelmed by stress → increased risk of relapse

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## Abuse, neglect, trauma and the brain

- Hyperactive stress response results from insecure attachment and from ACEs
- Brain development is altered by ACEs  
→ dysfunctional and chaotic organization
- Lower brain functions govern eating, self-soothing, self-harm
  - Use food, self-harm, etc. to regulate the lower brain (norepi, dopamine, serotonin) stress response and to self-soothe

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What is the purpose of therapy?



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## Therapy must change the brain

- Childhood maltreatment → **disorganized** or poorly regulated networks (monoamine neurotransmitters) in the **lower brain**
- Current treatment targets the limbic or cortical (cognitive and relational interactions)
- Changing the brain requires **repetitions** to modify the neural pathways in the brain

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## Case



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## Therapy must change the brain

- Childhood maltreatment → disorganized or poorly regulated networks (monoamine neurotransmitters) in the LOWER BRAIN
- Yet, current treatment targets the limbic or cortical (cognitive and relational interactions)
- Changing the brain requires repetitions to modify the neural pathways in the brain

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## Treatment Planning

- Assess ACEs and attachment styles – ACE Quiz
- Assess developmental status of the brain
- Lower vs. higher brain therapies – which come first
- How can you address food in a way that impacts lower brain and higher brain
- Management of stress and the stress response
- Building a foundation for recovery

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### Food and Cognition

- Nutrition can affect brain's *plasticity and nerve cell function* → impacts **COGNITION and MOOD**
- Brain uses ⅓ of blood sugar and oxygen
- Poor diet undermines the brain's ability to function
- Production of neurotransmitters requires:
  - Cofactors: Iron, Folate, B-vitamins, Vitamin C, Selenium, Magnesium, Zinc

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### The modern diet undermines brain function

- High glycemic load → high insulin → oxidative stress and inflammation
- Omega 3:6 ratio
- Poor nutrient density
- Low in pre- and probiotics
- High in acidity
- Food sensitivities: gluten / casein
- High in toxins, antibiotics, hormones

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## Omega – 3 Fatty Acids

- Omega 3 deficiency associated with poor learning and memory
- Omega 3 deficiency associated with: increased risk of ADD, dyslexia, dementia, depression, bipolar and schizophrenia  
Gomez-Pinilla 2008
- Increased EPA associated with decreased anxiety and increased DHA with decreased anger in substance abusers  
Buydens-Branchey 2008
- Substance abusers with higher levels of DHA were less likely to relapse  
Buydens-Branchey 2009

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## Diet for a healthy brain

- Curcumin – reduces brain inflammation
- B-Vitamins – improves memory and stress management
- Vitamin D – preserves cognition and immunity
- Iron – improves cognitive function in young women

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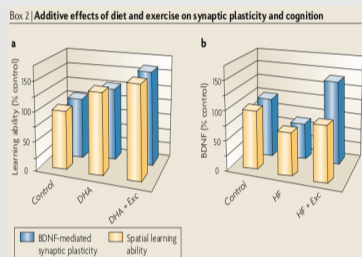
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## Additive effects of diet plus exercise on brain




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## Gut Brain

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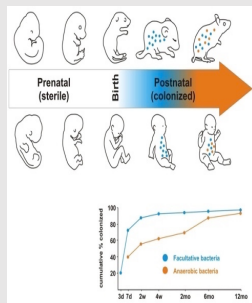
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## The Gut Brain: Colonization




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## Gut Brain

- Even mild gut infections can cause **anxiety-like behavior** and stress-induced memory loss (Gareau et al., 2011)
- **Germ-free mice** have a **hyperactive stress response** which is partially reversed when probiotics given (Sudo, et al 2004)
- **Treatment of mice with probiotics (*L. rhamnosus*) over 28 days** — less anxiety, depression and decrease in cortisol release in response to stress
- **Gut** has an essential role in control of the stress response (Foster JA, 2017)

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## CONNECTING THE DOTS

### • PATHWAY TO ADDICTION and ED

- ACEs
- Overwhelmed emotionally / hot wire / a dam
- Response -
  - Self medicate with substances or food
  - Explode → anger, DV
  - Shut down
  - Act out
- Core beliefs → I'm not worthy, I'm weak, I'm \_\_\_\_\_
- Pass on to next generations (EX. ACOA)
- Relationship issues, social problems, not reaching potential
- **THE PATTERN CONTINUES EVEN THOUGH THE ORIGIN IS FORGOTTEN OR DEEPLY BURIED**

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## Connecting the Dots

Early Adversity has Lasting Impacts




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## Connecting the Dots

- Genetics plus adverse childhood experiences (ACE) plus unhealthy Attachment PLUS Media / Culture stressing the THIN Ideal → **EATING DISORDERS**
- Genetics plus ACE plus Media / Culture giving mixed messages:
  - Food will make you better
  - But still have to stay thin
 → **OBESITY**

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ASAM defines addiction as a:

primary, chronic disease of  
*brain reward*, motivation,  
memory and related brain  
circuitry

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Moral failing

Weak

Just can't get it together

Have a disease

"What's wrong with you?"

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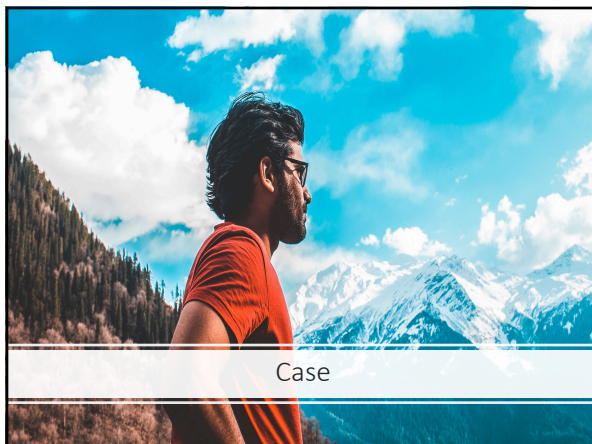
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## Principles of trauma-informed care

**Understanding Trauma and Its Impact:** Understanding traumatic stress and how it impacts people and recognizing that many behaviors and responses that may be seem ineffective and unhealthy in the present, represent adaptive responses to past traumatic experiences.

**Promoting Safety:**

Establishing a safe physical and emotional environment where basic needs are met, safety measures are in place, and provider responses are consistent, predictable, and respectful.

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## Principles of trauma-informed care

**Ensuring Cultural Competence:** Understanding how cultural context influences one's perception of and response to traumatic events and the recovery process; respecting diversity within the program, providing opportunities for consumers to engage in cultural rituals, and using interventions respectful of and specific to cultural backgrounds.

**Supporting Consumer Control, Choice and Autonomy:**

Helping consumers regain a sense of control over their daily lives and build competencies that will strengthen their sense of autonomy

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## Principles, cont'd.

**Healing Happens in Relationships:** Believing that establishing safe, authentic and positive relationships can be corrective and restorative to survivors of trauma.

**Recovery is Possible:** Understanding that recovery is possible for everyone regardless of how vulnerable they may appear; instilling hope by providing opportunities for involvement at all levels of the system, facilitating peer support, focusing on strength and resiliency, and establishing future-oriented goals.

<https://www.ctntraumatrain.org/assessment-tools.html>

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