

Epigenetics and Trauma

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Compassionate Inquiry[®]

Objectives

1. Learn the definition and symptoms of trauma
2. Learn the 7 hallmarks of trauma
3. Understand epigenetics and the mechanisms of inheritance
4. Understand the effects of trauma on children
5. Learn the principles that help to heal intergenerational trauma
6. Learn the features and characteristics of resilience
7. Learn the diet, foods and supplements that promote healing of trauma

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Definition of Trauma ~ Dr. Gabor Maté

“Trauma is a psychic wound that hardens you psychologically and then interferes with your ability to grow and develop. It pains you and now you’re acting out of pain. It induces fear and now you’re acting out of fear.

Trauma is not what happens to you, it’s what happens inside you as a result of what happened to you. Trauma is that scarring that makes you less flexible, more rigid, less feeling and more defended.”

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The Four Aspects of Trauma ~ Dr. Gabor Maté

1. The traumatic event that happened, or the trauma of neglect
2. There was no one to speak to when the trauma happened
3. There was a disconnection to parents/primary care-givers before the traumatic event – otherwise there would have been someone to talk to
4. Disconnection from the Self, loss of authenticity, agency

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The Seven Hallmarks of Trauma ~ Dr. Gabor Maté

1. Trauma is not what happens to you; it is what happens inside you as a result of what happens to you
2. Trauma results in a disconnection from yourself, your value, your feelings, your body, other people and the world
3. Trauma shapes your view of the world, causing a constriction

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The Seven Hallmarks of Trauma ~ Dr. Gabor Maté

4. You override your gut feelings, which help you to survive, due to trauma
5. Trauma makes it difficult to be in the present moment
6. Trauma changes your nervous system
7. Trauma programs your relationships

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What Is Trauma?

- Trauma is an emotional response to a terrible event like an accident, rape, physical abuse, neglect or natural disaster
- Immediately after the event, shock and denial are common
- Longer term reactions include unpredictable emotions, flashbacks, strained relationships, and physical symptoms such as headaches or nausea
- Many physical and emotional ailments later in life emerge from childhood trauma

What Is Trauma? ACEs Study

Adverse childhood experiences are common and can have negative long-lasting effects on our health. Ten types of trauma include

1. Physical abuse
2. Sexual abuse
3. Emotional abuse
4. Physical neglect

What Is Trauma?

5. Emotional neglect
6. Mother treated violently
7. Household substance abuse
8. Household mental illness
9. Parental separation or divorce
10. Incarcerated household member

What Is Trauma?

- Childhood adversity is defined as having experienced abuse, neglect, or household dysfunction before turning 18 years old
- ACE = Adverse Childhood Experience
- The number of ACEs was strongly associated with adulthood high-risk health behaviors such as smoking, alcohol and drug abuse, promiscuity, and severe obesity, and correlated with ill-health including depression, heart disease, cancer, chronic lung disease and shortened lifespan.

What Is Trauma?

- Compared to an ACE score of zero, having four adverse childhood experiences was associated with a seven-fold (700%) increase in alcoholism, a doubling of risk of being diagnosed with cancer, and a four-fold increase in emphysema
- An ACE score above six was associated with a 30-fold (300%) increase in attempted suicide

What Is Trauma?

Other sources of trauma, not listed in the ACES study can include:

- Minor automobile accidents, especially those that result in whiplash
- Invasive medical and dental procedures, particularly when performed on children who are restrained or anesthetized

What Is Trauma?

- Illness, especially when a high fever or accidental poisoning is involved
- Near drowning
- Choking incident
- Being left alone, especially for young children and babies

What Is Trauma?

- Prolonged immobilization, especially in children, such as when in a cast
- Exposure to extreme heat or cold, especially in children and babies
- Sudden loud noises, especially in children and babies
- Birth stress, for both mother or infant

What Is Developmental Trauma?

- Is caused by events in early childhood that overwhelm the child so that the brain and nervous system cannot develop in an age-appropriate way
- Thus can cause long-lasting changes and delays in physical maturation, behaviour, cognitive ability, emotional regulation and the ability to socialize with others – brain circuits don't develop as they should
- If the abuse is severe, and chronic, the child's brain structure may be damaged
- Childhood experiences that can lead to developmental trauma include: neglect, prenatal or perinatal trauma, loss of a significant person during the early childhood years, physical, sexual or emotional abuse

Symptoms of Trauma

Emotional Symptoms

- Panic attacks, anxiety and phobias
- Intrusive imagery or flashbacks
- Nightmares and night terrors
- Abrupt mood swings: Rage reactions or temper tantrums, frequent anger or crying
- Bipolar disorder, bulimia, psychosis
- Fear of dying or having a shortened life
- Learning disabilities, dyslexia, autism

Symptoms of Trauma

Emotional Symptoms

- Excessive shyness
- Diminished emotional responses
- Depression and feelings of impending doom
- Feelings of detachment, alienation and isolation (living dead syndrome)
- Depression; thoughts of suicide
- Lack of motivation
- Emotions of fear, sadness, anger, shame, disgust, hate latent in the bodymind, easily activated by triggers reminiscent of original trauma

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Symptoms of Trauma

Physical Symptoms

- Difficulty sleeping
- Chronic fatigue or very low physical energy
- Immune system problems; autoimmune disease, cancer
- Psychosomatic illnesses: headaches, migraines, neck and back problems, asthma, skin disorders, digestive problems
- Body and muscle tension
- Chronic pain

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Symptoms of Trauma

Hyperarousal

- Increased heart rate, rapid or difficulty breathing, cold sweats, tingling, muscular tension
- Hyperactivity
- Hypervigilance
- Extreme sensitivity to light and sound
- Exaggerated emotional and startle responses

Symptoms of Trauma

Hypoarousal

- Constriction in body and narrowing of perceptions
- Disassociation or denial
- Feelings of helplessness, immobility and freezing
- Mental blankness or spaced-out feelings, tuning out
- Inability to act or move
- Numbness, inability to feel body sensations or emotions

Symptoms of Trauma

Limiting Beliefs

- Shame and lack of self-worth
- Loss of sustaining beliefs (Spiritual, religious, interpersonal)
- *I'm not good enough; I'm not lovable; I don't matter etc.*
- Inability to ask for help
- Belief that one cannot be helped

Symptoms of Trauma

Memory Difficulties

- Amnesia or forgetfulness
- Difficulty learning or retaining new information
- Inability to recall childhood experiences

Symptoms of Trauma

Diminished Quality of Life

- Reduced ability to deal with stress
- Avoidance behavior: Avoiding places, moments, activities, memories or people
- Inability to love, nurture or bond with other individuals

Symptoms of Trauma

Behaviours

- Attraction to dangerous situations
- Addictive behaviors: Overeating, drinking, smoking, drugs, etc.
- Codependency
- Self-mutilation
- Inability to make commitments
- Reduced ability to formulate plans
- Inability to make decisions

Symptoms of Trauma

Behaviours

- Lack of self-care
- Poor personal grooming habits
- Re-enactment of the trauma – projection of the past onto the present
- Choosing a partner to perpetuate the trauma
- Exaggerated or diminished sexual activity
- Difficulty maintaining relationships
- Inability to leave an abusive or toxic relationship

Disconnection

- We lose the connection to our authenticity, emotions, to what we feel in the body, and to our spirit/essential Self
- Healing requires re-connection to the felt sense in the body, our gut feelings, our capacity to express ourselves authentically
- Addiction is an attempt to fill a need – ask, “*What is the addiction doing for you?*”
- The need may be comfort, happiness, stimulation, energy, reward, pleasure, confidence, calm, relaxation, to feel good, to relieve the pain
- Once a need is identified, we can look towards fulfilling it in a healthy way. The primary need is connection to Self and others

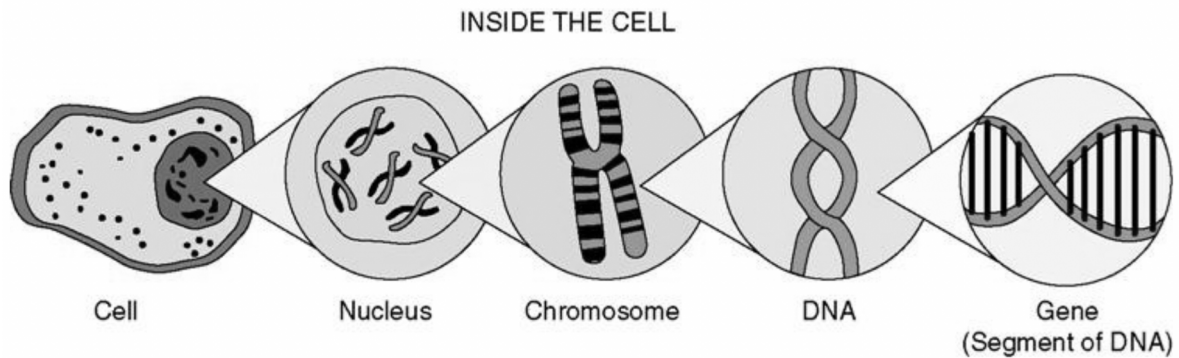
Connection

- We are wounded in relationship; we heal in relationship
- Healing from trauma requires positive social connections
- Healing requires connection to the body, to emotions, to spirit, to the land, plants and animals, and to the present moment through the senses
- Connection to culture, ancestors, spirituality, rituals, practices and goals for a meaningful, purpose-driven life with healthy social connections
- Connection to oneself, uniqueness, gifts, intuition, personal expression, creativity

Definitions – Genes, Genotype

- Gene – a section of DNA that encodes a trait, based on a precise arrangement of nucleotides. Genes exist on chromosomes at fixed locations. We inherit 2 sets of DNA (alleles) from our biological parents for each trait
- We have 23 pairs of chromosomes; 46 in total
- These sets of alleles may be identical (homozygous) or different (heterozygous)
- Genotype – The combination of alleles an individual inherits for a specific gene
- According to the Human Genome Project, humans have between 20,000 – 25,000 genes

Definitions – Genes, Genotype



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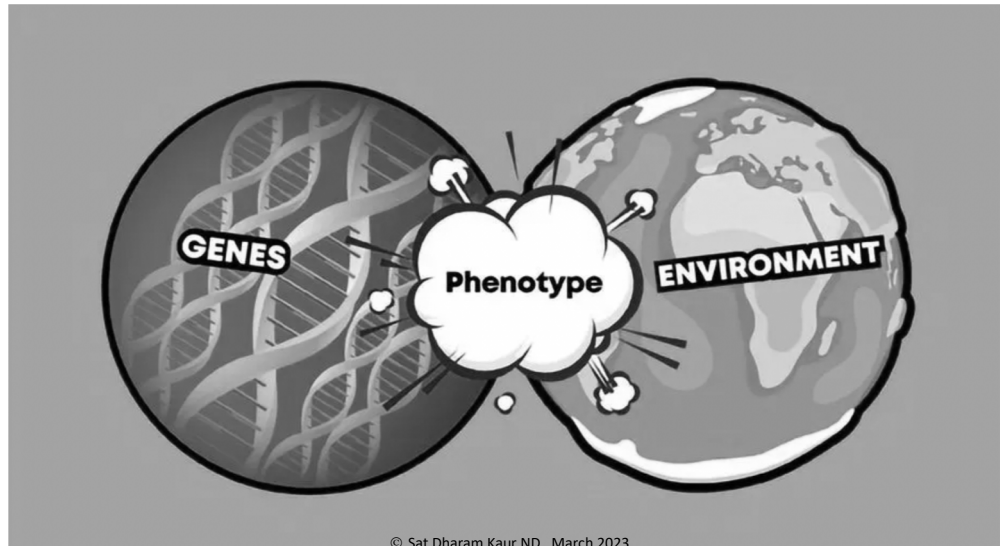
Definition - Phenotype

- Phenotype is sum of an organism's observable characteristics
- It includes physical form and structure, its developmental processes, its biochemical and physiological properties, its behaviour and the products of behavior
- The phenotype is influenced by the genotype, as well as epigenetic modifications and the environment, type of parenting, dietary and lifestyle factors
- The phenotype includes the expression of cognitive, personality, and behavioral patterns, which could include a psychiatric disorder or syndrome

(Cassidy, 2002; O'Brien, 1995; O'Brien, 2002)

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Definition - Phenotype



Epigenetics and Gene Expression

- Epigenetics refers to potentially heritable changes in genes that can be induced by environmental events, including trauma in a parent or grandparent
- These changes affect the function of DNA in the genes, but do not involve a change in DNA sequence i.e. specific genes are turned on or off via epigenetic mechanisms
- An epigenetic tag or “mark” is a chemical addition that attaches to the DNA and tells the cell to either activate or silence a specific gene
- If the genetic code is a language, the epigenetic tag is an accent

Causes of Epigenetic Changes in Gene Expression

- Behaviours, habits, exercise
- Diet and nutrition (harmful changes with high fat, high sugar diet)
- Chemicals and industrial pollutants
- In utero exposure to chemicals, stress, trauma
- Parenting style – nurturing or non-nurturing
- Chronic stress
- Trauma – prenatal, individual, intergenerational, historical

(Tiffon C, 2018)

Definitions - Epigenetics

- Epigenetic changes affect the regulation of gene activity and its expression in an individual and its offspring
- An epigenetic trait is a "*stably heritable phenotype resulting from changes in a chromosome without alterations in the DNA sequence*"
- Epigenetics is the modification of gene expression

(Berger et al, 2009; NIH Roadmap Epigenomics Project)

Epigenetics and Gene Expression

- The function of the gene changes without the DNA changing
 - Genetic code itself does not change
 - Expression of a trait can get turned on or off
 - These changes are durable, but can be reversed with certain conditions
- Changes in gene expression are not the same as the body and brain's chemical response to stress and trauma – this is a separate issue
- Epigenetic mechanisms can expand the range of ways we respond to stressful situations; can help populations adapt to current circumstances
- Prepares us for the traumas our parents experienced, which may still be present
- Can work for or against our survival

Epigenetics and Gene Expression

- 2% of DNA accounts for our physical traits = protein-coding genes
- 98% of DNA is considered noncoding DNA
 - Regulates other genes and processes
 - Responsible for emotional, behavioral, and personality traits
 - Can be affected by environmental influences
 - Any genes can be switched on/off via epigenetic tags

Mechanisms of Epigenetic Inheritance

1. Changes in DNA methylation and histone modification – primary mechanism
2. Changes in regulatory processes of non-coding DNA
3. Changes in the stress response and the hypothalamus-pituitary-adrenal (HPA) axis – alters activity of cortisol
4. Changes in brain-derived neurotrophic factor (BDNF), which is important for the developing brain
5. Changes in oxytocin, a hormone that regulates social bonding
6. Changes in the neurotransmitters, serotonin and dopamine

(Hoffman & Spengler, 2014; Jiang et al, 2019; Bondar et al, 2016; Baracz et al, 2020; Houwing et al, 2017; Howes et al, 2017)

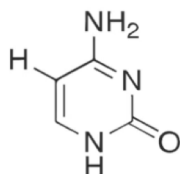
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DNA Methylation

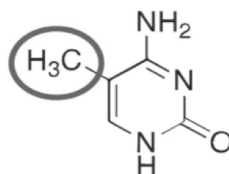
- Chromosomes comprised of the DNA sequence are wrapped around histones
- Histones are proteins that add structure and packaging for the DNA
- The extent of “tightness” with which DNA is wrapped around histones determines how accessible the DNA is to the cellular machinery that expresses it
- Chemical modifications can be made to the histones that affect how wound (or unwound) the DNA is
- The most common modification is DNA methylation, where a methyl group is added to the cytosine base of the DNA backbone, which alters how the DNA sequence is read, and can suppress gene expression

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DNA Methylation

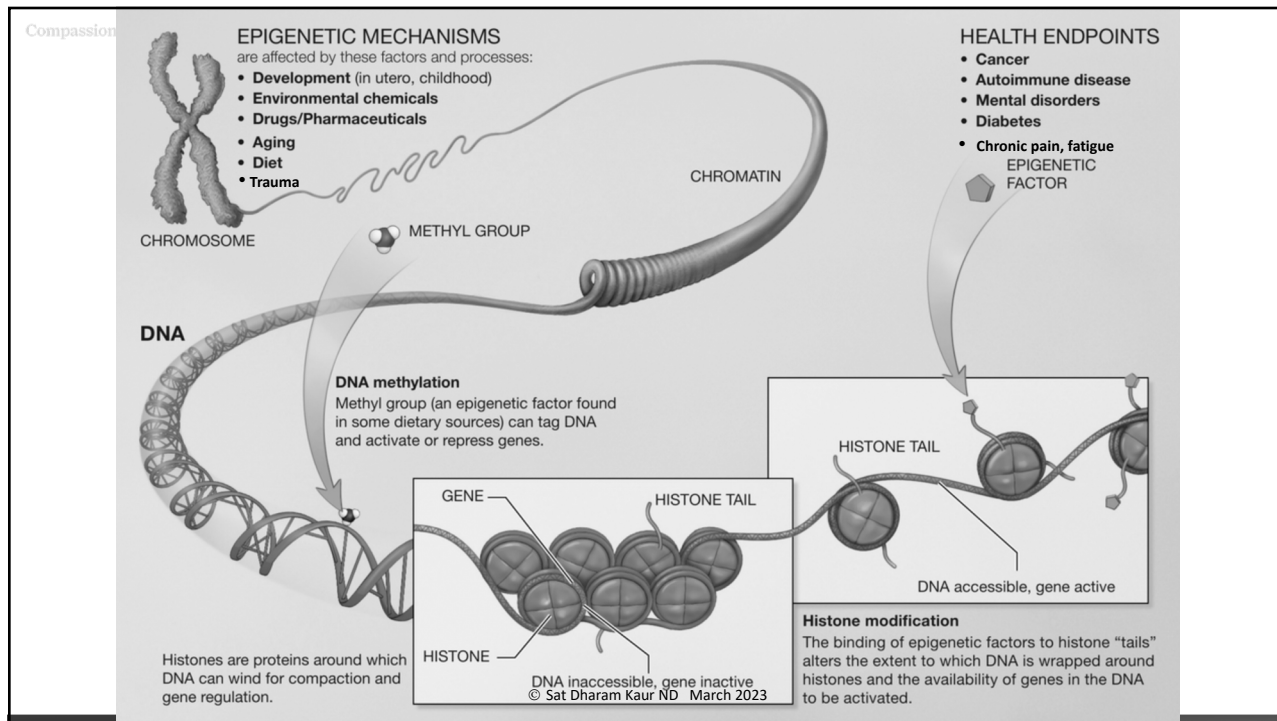


Cytosine



Methylated cytosine

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Epigenetics and Intergenerational Trauma

- Irregularities in DNA methylation can be transmitted, along with a predisposition to physical and emotional health challenges, to future generations
- Offspring are affected by both parents' trauma exposures occurring before their birth, as well as their grandparents
- A child of a parent who, early in life, lived in a war zone may inherit the impulse to recoil when hearing sudden loud noises

Epigenetics and Pregnancy

- Maternal stress and trauma impact the uterine environment
- Trauma or stress that a mother experiences during pregnancy not only impacts the developing offspring, but the germ cells that will create her grandchildren
- The eggs of future children are already present in a female fetus
- 3 generations are exposed to an event/trauma that occurs in pregnancy all at once

Epigenetics and Parenting

Trauma response can be passed on through parent's behavior:

- Communication style regarding the trauma – conspiracy of silence or oversharing
- Parenting style – nurturing or neglectful; anxious or calming
- Responsibility child feels to their parent for their suffering
- Identification with the parent's suffering

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Epigenetics and Parenting

Messages about the caregiver or parents' trauma are passed on:

- Child learns that they must suffer because the parent suffered
- Parent's unhealthy coping strategies for dealing with trauma reminders affect the child, with epigenetic changes

(Adelman, 1995; Baranowsky et al, 1998; Doucet & Rovers, 2010; Duarte et al, 2019; Mor, 1990)

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Modes of Epigenetic Transmission of Trauma

Modes of Epigenetic Transmission of Trauma	
Intergenerational Epigenetic Transmission of Trauma	
• Postnatal (Behavioural/Social) Effects	Epigenetic wounding by early mistreatment, abuse, traumatic incident or neglect
• Prenatal (Gestational) Effects	Epigenetic wounding by stressed prenatal environment
Transgenerational Epigenetic Transmission of Trauma	
• Preconception (Germline) Effects (at least 4 generations)	Epigenetic wounded inherited through cell division (meiosis), from egg and/or sperm – carried from previous generation(s)

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Causes of Epigenetic Changes in Animals

Mice and rats have been used to create conditions that mimic childhood trauma, including:

1. Maternal separation
2. Variations in maternal care
3. Early weaning
4. Social isolation

Research looked at stress response, behavior and cognitive function in adult rats who had been reared with these conditions

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Epigenetics and Intergenerational Trauma

Studies from animals and humans show that:

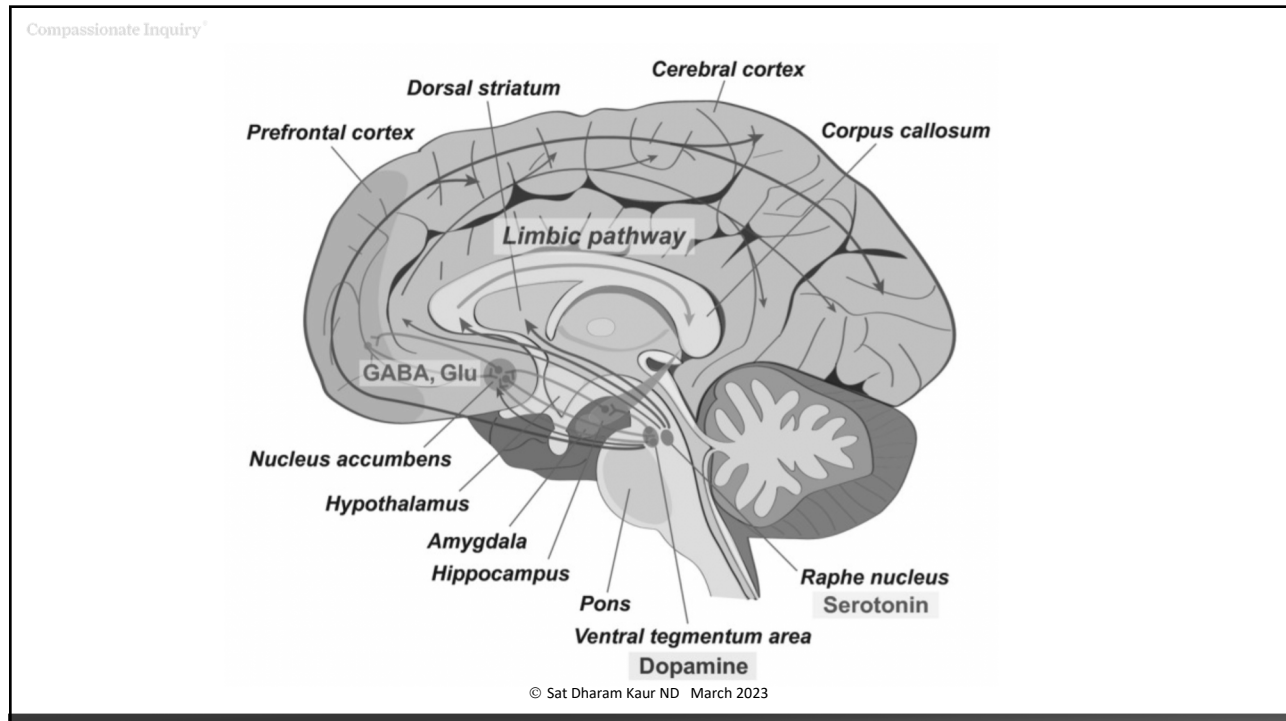
1. There are changes in DNA methylation, histone modifications or non-coding RNA, in response to adverse experiences in early postnatal life or adolescence
2. Changes affect the brain and behaviour and persist until adulthood
3. Childhood Trauma induced epigenetic changes can be reversed

(Thumfart et al, 2022)

Epigenetics, DNA Methylation and Trauma

Parts of the Brain Affected by Early Life Trauma and Epigenetic Changes:

1. Hippocampus - memory
2. Amygdala – alarm, fear, panic
3. Nucleus accumbens – craving for addictive substances or behaviour
4. Hypothalamus – regulates hormones and autonomic nervous system
5. Medial Prefrontal Cortex – controls activity of amygdala; registers safety. Trauma generates increased anxiety/fear with triggers
6. Brain Derived Neurotrophic Factor (BDNF) is decreased



Compassionate Inquiry

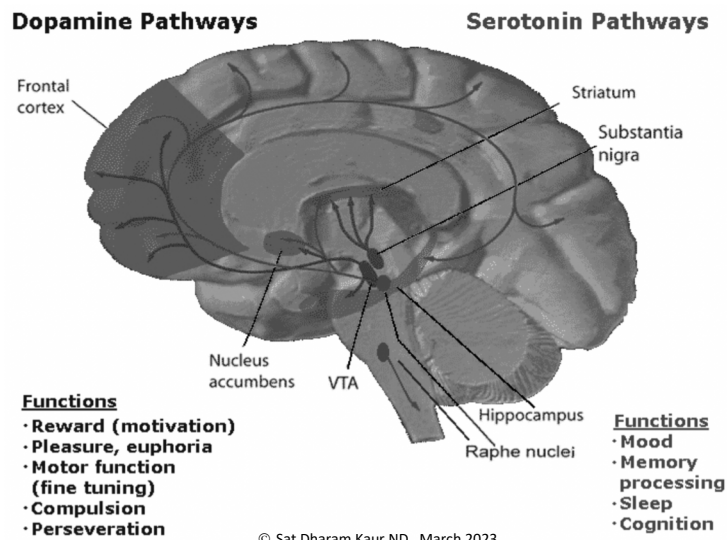
Epigenetics, DNA Methylation and Trauma

Parts of the Body Affected by Early Life Trauma and Epigenetic Changes:

1. White blood cells – susceptibility to autoimmune disease and cancer
2. HPA axis and receptors for cortisol – susceptibility to stress and inflammation
3. Oxytocin – bonding hormone decreased by DNA methylation
4. Neurotransmitters – serotonin and dopamine; link to depression, anxiety

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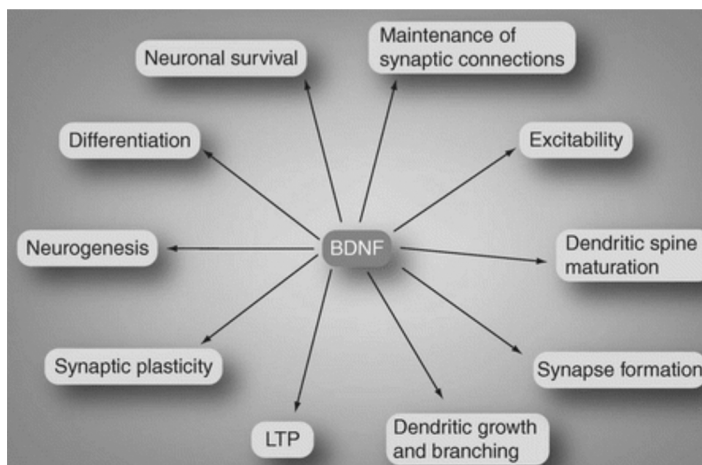
Serotonin and Dopamine Pathways



Epigenetics, Trauma and BDNF

- Brain Derived Neurotrophic Factor (BDNF) is involved in important neuro-developmental processes, such as the differentiation and growth of neurons, and its expression can be modified by life experiences
- It is a key molecule involved in brain plasticity related to learning and memory
- Chronic stress, aging and Alzheimer's are linked with lower levels of BDNF

Epigenetics, Trauma and BDNF



(Fahnestock M. 2011)

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Epigenetics, Trauma and BDNF

- Aerobic exercise and an enriched environment enhance the expression of BDNF
- Regular yoga practice increases BDNF
- Meditation increases BDNF
- Curcumin and resveratrol increase BDNF
- Frequent social activity can increase BDNF
- Psychedelics increase BDNF (ayahuasca, DMT, psilocybin, and LSD)
- High levels are found in the hippocampus, amygdala, cerebellum, cerebral cortex
- Decreases in BDNF are associated with aging and mental illness, Alzheimer's, and affect memory and the hippocampus

(Miranda et al, 2019; Tolahunase et al 2018; Cato et al, 2021)

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Epigenetics, Trauma and BDNF – in Animals

- Exposure of baby rats to stressed mothers during their first week of life increased DNA methylation in the prefrontal cortex, with decreased BDNF expression
- Rats separated from their mothers after birth, from days 2-14, who had a single stress in adulthood, had lower BDNF in the hippocampus, impacting memory

(Roth et al, 2009)

Epigenetics, Trauma and BDNF – in Humans

- In humans, severe childhood trauma, resulted in increased DNA methylation and decreased BDNF – this was linked to bipolar disorder, bulimia and depression
- Childhood trauma, increased methylation and decreased BDNF is associated with marked cognitive dysfunction and depression; or first-episode psychosis

(Roth et al, 2009; Perroud et al, 2013; Peng et al, 2018; Thaler et al, 2014)

Epigenetics, Trauma and Oxytocin – in Humans

- Low maternal care caused DNA methylation of the oxytocin system, and was linked to social anxiety later in life and anxious attachment style
- Childhood emotional neglect was associated with reduction of size of the hippocampus and had an impact on oxytocin

(Smearman et al, 2016; Parianen et al, 2020; Womersley et al, 2020)

Epigenetics, Trauma and Cortisol – Animal Studies

Studies from animals show that:

- The level of licking/grooming of the mothers towards their young determined long-term health
- Young raised by a low-grooming mother had increased DNA methylation and lower histone acetylation at the tag for the receptor gene for cortisol in the hippocampus, when they became adults
- Cortisol release was increased in the brain
- Can cause greater reactivity to stressors later in life; then soothe with opiates

(Thumfart et al, 2022; Weaver et al, 2004; Provencal et al, 2019))

Epigenetics, Trauma and Cortisol – Animal Studies

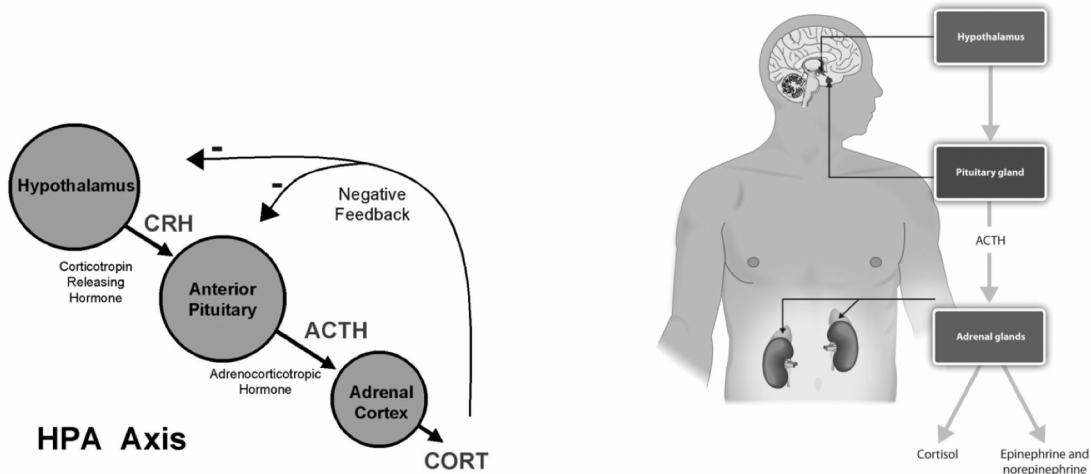
- In an experiment with rats, offspring that received low levels of maternal care were more anxious and reactive to stress in adulthood than rats that received high levels of care. The stress pattern persisted for multiple generations
- One study exposed male mice to repeated intense stress by separating them from their mothers. The rats showed depression-like symptoms
- Pups in the second and third generation showed the same symptoms of trauma despite never having experienced the stress themselves

(Nat. Neurosci. 2014; 7. 847-854.)

Epigenetics, Trauma and Cortisol – in Humans

- Lower cortisol and blunted cortisol reactivity were present in preadolescent boys and girls whose mothers had PTSD, a potentially epigenetic response
- Children of mothers exposed to childhood trauma, particularly emotional abuse, had higher sympathetic nervous system activation (fight/flight), which might be a marker for vulnerability to anxiety, compared to children of mothers with low emotional abuse

Epigenetics, Trauma and Cortisol – in Humans



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Epigenetics and Trauma – Animal Studies

- Mice were trained to fear a cherry-blossom scent by receiving an electric shock each time they were exposed to the smell
- The next two generations of mice became jumpy and avoided the smell, despite never being exposed to it before, and with no electric shock
- They inherited the sensitivity to the scent, and the fear response associated with it
- The behavioural effects of a traumatic event can persist for at least 3 generations

(Dias B, Ressler K. Parental olfactory experience influences behaviour and neural structure in subsequent generations. Nature Neuroscience 17;1, 2014)

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Epigenetics, Trauma and Neurotransmitters – Animals

- Childhood trauma can induce epigenetic changes in neurotransmitter systems in individuals and in their offspring
- Rats with low-grooming mothers have lower serotonin levels in the hippocampus
- Maternal separation and social isolation in the first 2 weeks of life are associated with lower dopamine levels

(Franklin et al, 2011; Razoux et al, 2017)

Epigenetics, Trauma and Neurotransmitters – Humans

- Childhood trauma in humans is linked with epigenetic dysregulation of serotonin, dopamine, and GABA
- Childhood sexual abuse resulted in hypermethylation of the serotonin system, leading to antisocial personality disorder
- Parental loss, physical and sexual abuse were associated with hypermethylation and severe depression
- Hypermethylation is associated with smaller hippocampal volume

(Beach et al, 2011; Vijayendran et al, 2012; Kand et al, 2013; Booij et al, 2015)

Epigenetics, Trauma and Neurotransmitters – Humans

- Sexual abuse led to hypermethylation of a gene that was associated with increased risk of alcohol and drug dependence as well as vulnerability to depression and anxiety symptoms in women
- Prenatal exposure to chronic stress in the mother caused epigenetic changes linked to suicide attempts in their children later in life
- Childhood trauma caused epigenetic changes linked to PTSD later in life
- DNA methylation was associated with insecure attachment style and perinatal depression

(Checknita et al, 2018; Alavian-Ghavanini et al, 2018; Gray et al; 2015; Mehta et al, 2013; Robakis et al, 2020)

Epigenetics and Toxic Stress

- *Toxic stress* is excessive or prolonged activation of stress response systems in the body and brain that can lead to dysfunction in the prefrontal cortex, the area of the brain linked to cognition and decision-making
- Chronic releases of stress hormones changes the way DNA is expressed and modifies epigenetic “markers” on genes, switching them on or silencing them
- Trauma is most harmful to infants ages 0 to 3, when more than 1 million new neural connections in the brain are formed every second
- Toxic stress causes epigenetic changes that allow trauma to be transmitted over generations

<https://developingchild.harvard.edu/resources/inbrief-science-of-ecd/>

Epigenetics and Toxic Stress

Toxic Stress is the strong, unrelieved activation of the body's stress management system in the absence of protective adult support.

Without caring adults to buffer children, the unrelenting stress caused by extreme poverty, neglect, abuse, or severe maternal depression can weaken the architecture of the developing brain, with long-term consequences for learning, behavior, and both physical and mental health.

<https://developingchild.harvard.edu/resources/inbrief-science-of-eed/>

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Effects of Trauma on Children

- Difficulty regulating emotions and behavior
- Reduced academic performance and IQ
- Reading difficulties
- Disruptive in school
- Delinquency
- Substance abuse
- Mental health disorders

(Anda et al. 2006; Delaney-Black et al. 2002; DePrince, Weinzierl, & Combs 2009; Flannery, Wester, & Singer, 2004; Lang et al. 2015; Lansford et al. 2002)

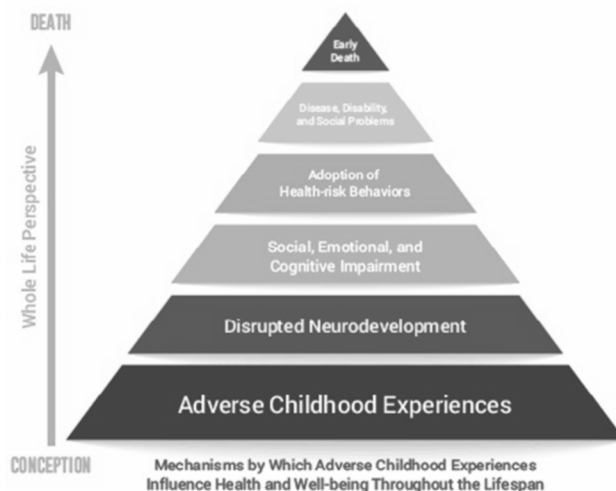
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Effects of Trauma on Children

- Disrupts brain development
- Immediate and lifelong adverse effects on social, emotional, and physical wellbeing
- Deficits in executive functioning (prefrontal cortex)
- Developmental delays
- Behavioral problems
- Health problems

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Effects of Trauma Over the Lifespan



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Intergenerational Trauma

- When an individual has a trauma response to a trauma experienced by a family member in a previous generation
- Also referred to as: Trans-Generational Trauma, Generational Trauma, Multi-Generational Trauma, Inherited Family Trauma, Hereditary Trauma
- Is cumulative trauma through generations
- Refers to a collective and compounding emotional and psychological wounding over time, both in one's lifetime and across generations that will affect mental-emotional and physical well-being for generations

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Intergenerational Trauma

Not *"What's wrong with me?"*

(Shift away from judging the problematic behavior, or making oneself wrong)

↓ ask

"What happened to me?"

(Look at the behavior within the context of the person's life experiences – through a compassionate biopsychosocial and historical lens)

↓ ask

"What happened in my family?"

(Look at the behavior within the context of the individual's own experiences, as well as the experience of parents, grandparents and community or culture)

↓ realize

"I am not what happened to me."

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Historical Trauma

- The trauma is experienced by a collective group of people
- Numerous and sustained attacks against a group or culture can accumulate over generations and interact with current stressors to undermine collective well-being
- Unique implications for the group as opposed to trauma experienced on a more individual basis
- Communal trauma, cultural trauma – affects the identity of the culture
- Examples include African-American slavery, the Holocaust, forced migration, colonization of Native Americans, Ukraine refugees, Tutsi genocide in Rwanda

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Intergenerational Trauma Response Can Look Like

- Substance abuse
- Self-destructive behavior
- Suicidal thoughts and attempts
- Low self-esteem
- Anger
- Difficulty expressing emotions
- Difficulty handling stress
- Behavior problems
- Emotional sensitivity
- Startle response
- Attachment issues
- Perfectionism
- Obesity

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Intergenerational Trauma Response Can Look Like

- Depression
- Anxiety, Phobias
- Panic attacks
- Attention/concentration issues
- Self-harming
- Conduct problems
- School problems
- Eating disorders
- Nightmares
- Sleep issues
- Domestic violence
- Relationship problem
- Hypervigilance

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Historical Trauma and Holocaust Survivors

- One study compared methylation rates in 32 Holocaust survivors and 22 of their children with those of matched controls
- Holocaust survivors and their children showed changes in the same stress-related gene linked to PTSD and depression — while controls did not

(Yehuda et al, 2016)

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Historical Trauma in First Nations

Trauma caused by European colonization:

- Mass deaths caused by foreign disease
- Loss of language, rituals, spiritual practices, songs
- Loss of traditional medicine and social organization structure
- Loss of lands and resources; relocation
- Rape and murder of women and children
- Imposition of state legislature and institutions, residential schools - the Indian residential school (IRS) system in Canada ran for over a century until the last school closed in 1996
- Child welfare system; loss of self-government

Historical Trauma in First Nations

- These traumas cause stress, confusion, disrupt the Aboriginal identity
- Indigenous people have been injured, oppressed and dehumanized by colonization
- Powerlessness and hopelessness disrupt the life of the individual, family, community and nation
- There is spiritual injury, soul-wounding, ancestral hurt (Eduardo Duran)
- The healthy identity of a people is disrupted = ethnostress

Historical Trauma Effects



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Epigenetic Changes are Dynamic

- Epigenetic marks can be acquired and removed throughout life in a dynamic and adaptable fashion
- Their dynamic nature allows the possibility to reverse them via psychological, pharmacological, nutritional, dietary, and lifestyle interventions, such as yoga, breathing exercises and meditation
- It is possible to mitigate their long-term impact on gene expression and behavior

(Wong et al, 2010)

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Resilience

Resilience refers to the “*ability to withstand and rebound from disruptive life challenges*” by using strengths, resources, and positive adaptations

Common, defining features of resilience include:

1. The capacity of a dynamic system to adapt successfully to disturbances that threaten its function, viability, or development.
2. The ability to avoid harmful behavioral and physiological changes in response to chronic stress.
3. A process to harness resources to sustain well-being.

(Walsh, 2003)

Resilience

4. The capacity to resume positive functioning following adversity.
5. The capacity to be less vulnerable to shock or disturbance.
6. A person’s ability to adapt successfully to acute stress, trauma, or more chronic forms of adversity.
7. The process of adapting well in the face of adversity, trauma, tragedy, threats, or significant sources of stress.

(Science of Resilience 2015)

Characteristics of Resilience

Characteristic	Definition
Optimism	Positive affect: expectation of a good outcome
Humor	Adaptive and protective mechanism used to minimize threat
Cognitive Flexibility	Ability to produce alternative outcomes, solutions, goals, reframe challenging situations, accept uncontrollable situational features
Coping Skills	Active use of productive strategies for solving problems, managing stress, and regulating emotions during stressful events
Skill at Facing Fears	Critical appraisal of threats; selecting appropriate actions to move through fear
Moral Compass	Spiritual or religious beliefs that guide coping
Altruism	Moral compass in action: assisting and caring for others
Role Model	Learning through observation of a resilient person
Social Support	Network of people that buffer against stress: protects personal well-being.
Physical Exercise	Active form of stress management that increases physiologic and psychologic resilience.

(Miller et al, 2020; Haglund et al, 2007)

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Transmission of Resilience

- Resilience is transmitted in the same way as trauma
- Many people who experience trauma are able to move forward without the event causing significant disruption to their lives

Post-traumatic Growth

- *“the experience of positive change that occurs as a result of the struggle with highly challenging life crises”*
- Reconstructs the narrative of the traumatic event to one of victory
- Finds meaning in the event and results in personal growth - Viktor Frankl
- Internal resources are accessed

(Gapp et al, 2016; Tedeschi & Calhoun, 2004)

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Transgenerational Trauma Resilience

- Emphasizes an ecosystem view of trauma, culturally relevant and strength-based interventions, and attention to sociopolitical concerns that may impact trauma and recovery
- Trauma can lead to the formation of new strengths and positive ways of coping and making meaning
- Can use the lens of resilience within an ecosystem framework to promote the inherent strengths and systemic supports of clients who have experienced trauma

(Goodman R, 2013)

Transgenerational Trauma Resilience

- Accessing support from families and communities is critical for trauma recovery and the development of resilience
- Discrimination and racism are sources of traumatic stress for individuals and communities
- Resilience can be transmitted across generations
- Coping strategies, ways of overcoming traumatic stress, and ways of sustaining one's culture despite oppression can also be passed down

(Duran, Firehammer, & Gonzalez, 2008)

Transgenerational Trauma Resilience

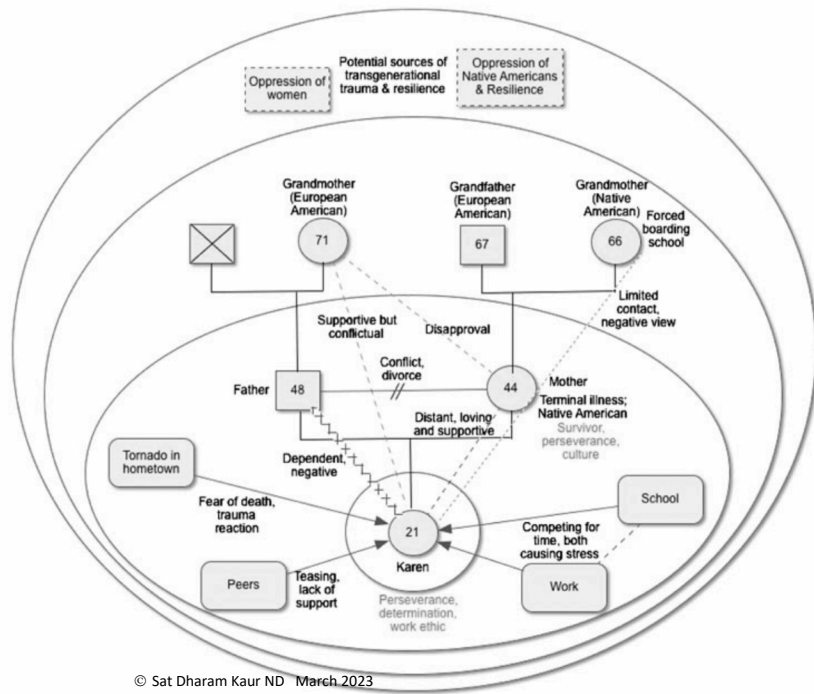
- A genogram can be used to support understanding of ancestral trauma
- A comprehensive genogram can include ancestral traumatic events or neglect, coping strategies, strengths
- It can incorporate cultural dimensions, including immigration, war, ethnic and racial identities, social class, gender, and spiritual/religious identities
- The genogram can incorporate cultural factors that impact an individual, as well as strengths and resources within a person's social systems

(Walsh, 2006; Ivey & Ivey, 1999)

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Transgenerational Trauma and Resilience Genogram

(Goodman, 2013)



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Transgenerational Trauma Questions

Trauma Questions

1. What events have occurred in your life (or your family or community) that have been very stressful or traumatic?
2. In what ways have you, your family, or your community experienced direct, indirect, traditional, or ecosystemic stress or trauma?
3. What do you notice about the way this event (or these events) have impacted you (or your family or your community)?

Transgenerational Trauma Questions

Resilience Questions

1. Tell me about yourself (or your family or your community) before the event(s).
2. What are your strengths (or those of your family or your community)?
3. What challenges have you (or your family or your community) overcome?
4. How have you (or your family or your community) maintained your strengths, your culture, or your community in the face of these stressors?
5. Are there internal or personal characteristics, family characteristics, or community characteristics that have helped?

(Goodman R, 2013)

Transgenerational Trauma Questions

Resilience Questions

1. When someone in your family or community is upset (or hurt or distressed), what do they do (or who do they talk to or where do they go for help)?
2. What are the typical ways that you (or your family or your community) heal or get better after something difficult?
3. What does “being well” look like to you (or your family or your community)?
4. What would it mean to get better for you (or your family or your community)?
5. What stories did you hear from your family or community about your family or community history? How did these influence how you see yourself or the world?

(Goodman R, 2013)

Healing Historical Trauma

- Repair the individual’s and community’s connection with their culture, values, beliefs, and self-image
- Counseling, spiritual support, community gatherings and ceremony
- Renewal of culture, spiritual beliefs, customs, and family connections
- Affirm the individual’s positive self-image, unique identity and place within a community
- Connect to traditional lands to learn cultural practices that have been lost

(LaConnor, 2002; Gone et al 2015, 2016)

Healing Historical Trauma

- Revitalize practices and ways of being necessary for individuals within communities
- Relieve personal distress and promote individual coping
- Adopt community-wide efforts to end intergenerational transmission of collective, historical trauma

(LaConnor, 2002; Gone et al 2015, 2016; Weaver, 1999)

Epigenetic Diet for Protection

- Folate and B12 are necessary for DNA methylation patterns (leafy greens, orange juice)
- Low maternal folate is associated with developmental delay and childhood behavioral difficulties such as hyperactivity and inattention; autism
- Choline can alter DNA methylation status – eggs, Swiss chard
- Green tea inhibits DNA methylation
- Mediterranean diet is protective, with fruits, vegetables, poultry, whole grains, olive oil, mixed nuts (low in red meat and saturated fat) – is associated with positive learning and behavioural outcomes in early childhood when mother has this diet in pregnancy

(Kim et al, 2009; Davis et al, 2007)

Foods the Support Brain Function

- Deficiency of omega-3 fatty acids has been associated with increased risk of attention-deficit disorder, dyslexia, dementia, depression, bipolar disorder and schizophrenia DHA is a component of neuron cell membranes, and the body is inefficient in synthesizing it
- Omega-3 fatty acid supplementation reduces deficits in reading and spelling in children (fish oil, flaxseed oil)
- Omega-3 fatty acids containing DHA 88 mg and eicosapentaenoic acid (EPA) 22 mg per day and micro-nutrients (iron, zinc, folate and vitamins A, B6, B12 and C) improved verbal intelligence, learning and memory in children after 6 months

(Gomez-Pinilla F. 2008)

Foods the Support Brain Function

- Junk food high in saturated fat and sugar result in poor cognitive performance and reduced hippocampal levels of BDNF-related synaptic plasticity after only 3 weeks of dietary treatment in rodents
- Antioxidants curcumin (turmeric) and vitamin E counteracted the effects of this diet
- The flavonols quercetin and epicatechin reduce learning and memory impairment in rodents with diminished blood supply to the brain
- Excess calories can reduce synaptic plasticity and increase the vulnerability of cells to damage by causing free-radical formation

(Gomez-Pinilla F, 2008)

Foods the Support Brain Function

Nutrient	Food Origin
Omega 3 Fatty Acid	Flaxseed oil, fish oil, walnuts
Quercetin	Onion, shallots, red apples, grapes, berries, cherries, kale, tomatoes, broccoli, Brussels sprouts, cabbage, citrus, peppers
Epicatechin	Cacao, dark chocolate, broad beans, black grapes, green tea, apples, blackberries, cherries, fava beans, raspberries, pears
Curcumin	Turmeric
Vitamin E	Sunflower seeds, almonds, hazelnuts, avocado, trout, red pepper, Brazil nuts, mango, turnip greens, peanuts, pine nuts, kiwi

(Gomez-Pinilla F, 2008)

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Epigenetic Diet to Regulate Methylation

Nutrient	Food Origin
Methionine	Egg, sesame seeds, Brazil nuts, hemp seeds, soy, dairy, chicken, fish, beef, chia seeds
Folate (5-MTHFR)	Brussels sprouts, broccoli, dark leafy greens, asparagus, oranges, black-eyed peas, chick peas, kidney beans, beef liver
Vitamin B12 (Methylcobalamin)	Meat, fish, cheese, eggs, B12 supplement
Vitamin B6 (Pyridoxil-5-phosphate)	Chick peas, salmon, chicken, potatoes, turkey, banana, bulgur, squash, nuts, spinach, tofu
SAM-e (SAM)	Dietary supplement
Choline	Egg yolk, meat, poultry, Brussels sprouts, broccoli, cauliflower, Swiss chard
Betaine	Wheat, spinach, beets
Resveratrol	Red wine, grapes
Curcumin/Turmeric	Turmeric
Genistein	Soy
Sulforaphane	Broccoli sprouts
Diallyl sulphide (DADS)	Garlic

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Epigenetic Diet for Protection - Polyphenols

Consuming polyphenol-rich foods over the long term reduces risk of the following ailments, all of which are increased with childhood trauma:

1. Cardiovascular disease and hypertension
2. Degenerative neurological diseases, such as Alzheimer's and Parkinson's
3. Diabetes
4. Cancer
5. Infection
6. Asthma
7. Aging

10 Strategies to Increase Polyphenols

1. Have three cups of herbal tea daily, including peppermint, sage, rosemary, chamomile, lemon balm and rosehip in your blends.
2. Have a cup of chai, green tea, or a soy/green tea latté
3. Create refreshing drinks combining apple, pear, blueberry or pomegranate juice with herbal teas such as rosemary, sage, clove and cinnamon.
4. Add cloves, cinnamon and ginger to pancakes, oatmeal, soups and apple cider
5. Add turmeric, clove, cinnamon and cardamom to the water when boiling rice

10 Strategies to Increase Polyphenols

6. Add ground cloves, cumin, coriander, turmeric and curry powder to sautéed onions, garlic, ginger and tofu
7. Add black olives to salads or use an olive paste with bread or flaxseed crackers
8. Snack on pecans, hazelnuts, almonds, walnuts and cashews
9. Add cumin, sage, oregano, rosemary and/or basil to bean dips made from pinto beans, black beans, lentils, black-eyed peas
10. Make a kidney bean chili, adding onion, garlic, basil, thyme, rosemary and/or oregano to your tomato base

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Other Protective Foods

1. Curcumin in turmeric
2. Soy (organic)
3. Brassica family – cabbage, broccoli, kale, cauliflower etc.
4. Brazil nuts (selenium)
5. Garlic
6. Tomatoes
7. Rosemary, parsley
8. Berries – especially purple

(Hardy et al, 2011)

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