**Introduction to the NMT**

The ChildTrauma Academy

**Theory of Change**

Why do you do the things you do? How do you think they will cause change for the client – for your child?

**NMT Core Principles**

A. Brain Organization and Function

- The human brain is the organ responsible for everything we do. It allows us to love, laugh, walk, talk, create or hate.
- The brain - one hundred billion nerve cells in a complex net of continuous activity - allows us our humanity.
- For each of us, our brain's functioning is a reflection of our experiences.

**The Brain Matters**

- Abstract thought
- Concrete Thought
- Affiliation
- "Attachment"
- Sexual Behavior
- Emotional Reactivity
- Motor Regulation
- "Arousal"
- Appetite/Satiety
- Sleep
- Blood Pressure
- Heart Rate
- Body Temperature

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Introduction to the NMT

Cortical Modulation

NMT Core Principles

B. Neurodevelopment and Memory
**The Brain Develops**

The human brain, with all of its complex structure and function, does not just “pop” into existence.

In the 9 months following conception, 100 billion neurons and 10 trillion glial cells are born. These cells organize, move, connect and specialize to create the amazing and functioning brain of the newborn.

**USE-DEPENDENT DEVELOPMENT**

The more a neural system is “activated,” the more that system changes to reflect that pattern of activation

*This is the basis for development, memory and learning.*

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**Brain Growth vs. Body Growth**

![Graph showing brain growth vs. body growth](image)

**Sequential Neurodevelopment**

- The brain is undeveloped at birth
- The brain organizes from the “bottom” up - brainstem to cortex and from the inside out
- Organization and functional capacity of neural systems is sequential
- Experiences do not have equal “valence” throughout development

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**What is Memory?**

- The capacity to bring *elements* of an experience from one moment in time to another.
- This is the unique property of life forms.
- There are many ways that life forms do this - genes, immune system, nervous system
- Nervous tissue is *designed* to store elements of experience.

**Association**

- The brain makes associations between sensory signals co-occurring in any given moment in time
- This capacity allows humans to learn, create images of the future and survive.
- This capacity can also make humans vulnerable to false associations - creating fears of non-threatening objects.
Creating First Memories

The first set of unique sensory stimuli shape neural “networks” which will “encode” and store – in neurons – the template for future sensory stimuli similar to this original sensory experience.

NMT Core Principles

C. Relational Neurobiology and Attachment

Human beings are social creatures.

The neural systems which mediate social interaction, communication, empathy and the capacity to bond with others are all shaped by the nature, quantity and timing of early life relationships.

Relational Neurobiology

Foundational Neural Systems

The neural systems mediating the stress-response, reward, procreation, reproduction, social-affiliation and communication are all are inter-related - indeed, they often share the very same fundamental neurotransmitter networks and brain regions.
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Stimulation of “Reward” Neural Systems in the Human Brain: Sex

- Drugs of Abuse: cocaine, opiates, stimulants
- Behavior consistent with value or belief system

- Sensation of pleasure and safety
- Release of hormones and “calmer” regulation of stress response

- Increase physiological distress
- Decrease physiological distress

- Relational Interactions
  - Multi-sensory cues
- DA

- LC NE

- NA

Casual - Routine - Personal - Intimate

History of Relational Interactions

Intimacy Barrier

Sensation of pleasure and safety

Drugs of Abuse

Cut, pick, pull

Release of hormones and “calmer” regulation of stress response

Stimulation of “Reward” Neural Systems in the Human Brain: Sex

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**NMT Core Principles**

D. Stress, Distress and Trauma

- **Stress**
  - Unpredictable
  - Severe
  - Vulnerability
  - Predictable
  - Moderate
  - Resilience

**External Soothing**

Responsive Caregiving (e.g., feeds, soothes)

**External Soothing**

Responsive Caregiving (e.g., feeds, soothes)

- **Bonding Behaviors Decrease when the Caregiver is Overwhelmed or in Distress**
  - With increasing threat and distress, an individual’s capacity to “give” to others is diminished.

- **Responses to Stress, Distress, Trauma**
  - Heterogeneity of response patterns
  - Adaptive changes in cognition
  - Adaptive changes in affects
  - Adaptive changes in behavior
  - Adaptive changes in neurophysiology
  - Adaptive changes in physiology
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Dissociation

Terror
Fear
Alarm
Alert
Calm

Stress
Trauma

DISSOCIATIVE/AROUSAL BALANCE

Dissociation
Arousal

Females
Males
Young Children
Older Children
Torture/Pain
Observer
Inescapable Helplessness
Action
Active Role

Resting Heart Rates: Branch Davidian Children

Assault
Parent Visits
Fire

Differential “State” Reactivity

Terror
Fear
Alarm
Alert
Calm

Baseline
Stress
Extreme Stress

“Out” “In”

Evocative cues associated with previous trauma

D.K. Provocative Challenges

Mean rate

Time (min)
A Neurodevelopmental Definition of Neglect

- Lack of a specific pattern of experience during development results in abnormal development of a core brain function
- The abnormal development is in those brain systems which sense, perceive, process, “interpret”, and “act on” information related to that specific experience or input.

To neglect a child is to murder them.

Daniel Dafoe

Early Childhood Neglect

Family portrait by an 8 year old boy. Adopted at age 3 from an Eastern European orphanage.
Multiple Forms of Neglect

**DOMAINS**
- Emotional
- Social
- Cognitive
- Motor

**PATTERN**
- Episodic
- Chaotic
- Total global

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Core elements of positive developmental, educational and therapeutic experiences

- Relational (safe)
- Relevant (developmentally-matched)
- Repetitive (patterned)
- Rewarding (pleasurable)
- Rhythmic (resonant with neural patterns)
- Respectful (child, family, culture)

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Neuroarchaeology

- The age at which an adverse event takes place will influence the neurodevelopmental impact and the resulting functional consequences
- Therefore, developmental history of adverse experiences is crucial to understanding current functioning
- NMT includes a developmental review of adverse experiences AND the buffering effects of relational health

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Sequencial Development

Sequential Vulnerability

- Neocortex
- Limbic
- Diencephalon
- Brainstem
Some things worth knowing you can not measure. Some things you can measure are not worth knowing.

Albert Einstein

Neurodevelopmental Risk

- The NMT process involves assessing the timing, nature and intensity of adverse events
- The timing, nature and quality of “buffering” relational health is assessed as well
- An estimate of “developmental risk” is obtained at various times during development by combining the AE and RH scores

Current Relational Health

- A major factor in healing appears to be the nature, quality, intensity and stability of a person’s relationships
- The NMT assessment process includes a simple metric that looks at current relational health
- The score on this metric is a key indicator of outcome – good relational stability predicts positive outcome – and poor relational health predicts poor outcomes

NMT Brain Mapping Process

- The key indicator of brain organization and neurophysiological status is function
- By creating a simplified construct – the brain map – assessment of key brain-mediated functions can help “localize” neurodevelopmental vulnerabilities and strengths
- This “localization” helps direct developmentally-sensitive interventions

CNS Functional Map

- Several “brain map” models have been used in the process of creating and refining the NMT
- Current mapping process involves a web-based menu-driven review of various brain-mediated functions
- The resulting “map” creates a visual representation that is useful for teaching, treatment planning and tracking outcomes
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Primary Neural Impact of Various Therapeutic, Educational or Enrichment Activities

Primary Somatosensory

Traditional Psychotherapy or Primary Cognitive Activity

Relational/Somatosensory
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Sequential Neurodevelopment and Play

- CORTICAL
  - Enhance Abstract Thought
    - Rhythm
    - Language
    - Arts
    - Values
- LIMBIC
  - Facilitate Socio-emotional Growth
    - Time
    - Play
    - Trust
- MIDBRAIN
  - Incorporate Sensory-Sensory Integration
    - Language
    - Time sense
    - Words
- BRAINSTEM
  - Establish State Regulation
    - Primitive
    - Time sense
    - Task-oriented

NMT Core Principles

G. NMT Application and Outcomes

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Christopher 14 yo M
Sandhill Child Development Center

Tom: 9 yo boy 9 months p TX (massage and simple rhythmic MM)

Tom: 10.8 yo boy 18 months p TX (massage/MVR and exploratory parallel play)

Tom: 11.2 yo boy 24 months p TX (storytelling: dancing conventions; play tea)

Tom: 12.2 yo boy 36 months p TX (musical theatre, individual psychotherapy; family TX)

Tom: 16 yo boy (episodic TX context)
NMT Core Principles

H. Current NMT Metric Reports