The Impact of Trauma on Development: The Neurosequential Perspective

Meet the Presenters

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NME Trainer
Great Circle

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Director of Trauma Informed Services
Great Circle

Special thanks to the work of Dr. Bruce D Perry, MD, PhD and The ChildTrauma Academy, who have granted their permission for the use of their slides.
Trauma

• an experience that overwhelms a person’s ability to cope
• a person feels threatened or witnesses an immediate threat to loved ones
• often creates a sense of horror, helplessness or hopelessness
• person feels unable to prevent the situation, intervene, or protect him/herself and/or loved ones

Big T, Little T

• Bullying
• Domestic violence
• Car accident
• War
• Physical abuse
• Loss

• Lost keys
• Debit card doesn’t work
• Move
• Change at work
• Lack of sleep
• Traffic

Common Responses

Re-Experiencing
- Nightmares
- Intrusive memories
- Flashbacks

Avoidance
- People
- Places
- Activities

Emotional Numbing
- Loss of interest
- Estrangement
- Detachment

Arousal
- Startle Response
- Irritability
- Hypervigilant
Early maltreatment has enduring negative effects on brain development. Our brains are sculpted by our early experiences.....Child abuse isn’t something you “get over”.

~Martin Tiecher, MD, PhD, Scientific American

Hidden Epidemic

Developmental Trauma
- Pervasive pattern of dysregulation
- Problems with attention and concentration
- Difficulties getting along with themselves and others

“We remember trauma less in words and more with our feelings and our bodies. “

~Bessel Van der Kolk, M.D.
The Neurosequential Model

The brain mediates our thoughts, feelings, actions and connections to others and the world.

The Principles of Brain Development

1. The brain is organized in a hierarchical fashion such that all incoming sensory input first enters the lower part of the brain.
2. Neurons and neural systems are designed to change in a “use dependent” fashion.
3. The brain develops in a sequential fashion.
4. The brain develops most rapidly early in life.
5. Neural systems can be changed but some systems are easier to change than others.
6. The human brain is designed for a different world.

“Healthy organization of the neural networks depend upon pattern, frequency and timing of key experiences during development.” (Perry)
Mothers’ Speech and Child Vocabulary

Huttenlocher et al., 1991

“Out” “In” The ChildTrauma Academy

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Patterned, Repetitive Activity Changes the Brain
**Brainstem**

- **Age of most growth**: 0-9 months
- **Critical Functioning Being Organized**: Regulation of arousal, sleep and fear 'states'
- **Primary Development Goals**: State Regulation, Attachment, Flexible Stress Response, Resilience
- **Therapeutic Activities**: Massage, Rhythm, EMDR

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**Diencephalon**

- **Age of most growth**: 6 mos - 2 years
- **Critical Functioning Being Organized**: Integration of multiple sensory inputs, Fine motor control
- **Primary Development Goals**: Sensory Integration, Motor Control, Relational flexibility, Attunement
- **Therapeutic Activities**: Music and movement, Therapeutic massage, Animal interactions

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**Limbic**

- **Age of most growth**: 1-4 years
- **Critical Functioning Being Organized**: Emotional states, Social language
- **Primary Development Goals**: Emotional Regulation, Empathy, Affiliation, Tolerance
- **Therapeutic Activities**: Play Therapies, Creative Arts, Parallel Play
Age of most growth
3-6 years

Critical Functioning Being Organized:
- Abstract cognitive functions
- Social-emotional integration

Primary Development Goals:
- Abstract Reasoning
- Creativity
- Respect
- Moral/Spiritual foundations

Therapeutic Activities:
- Storytelling
- Formal Education, Insight Oriented Therapies, Cognitive Behavioral Interventions

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Memory

stores cognitive information — names, faces, facts

stores emotional information — fear, pleasure, sadness

Typing, riding a bike, playing a piano

Anxiety or arousal states associated with traumatic events

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Calm
Neocortex
Alert
Limbic
Alarm
Diencephalon
Fear
Midbrain Brainstem

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Neocortex
Limbic
Diencephalon
Midbrain
Brainstem
Calm
Alert
Alarm
Fear
Abstract
Concrete
Vigilance/
Avoidance
Emotional
Resistance/
Compliance
Reactive
Defiance/
Dissociation

Differential “State” Reactivity
Sensitized
Neurotypical
Resilient
Terror
Fear
Alarm
Alert
Calm
Baseline
Stress
Extreme Stress
### Threat Response Systems

<table>
<thead>
<tr>
<th>Hyperarousal</th>
<th>Dissociation</th>
</tr>
</thead>
</table>
| • “fight” or “flee”  
• Sympathetic nervous system activation  
  - Increased heart rate, breath rate, sweating, and pupil and vascular dilation  
• More common in males than females  
• More common with older children | • Prepare for injury  
• Increase opioids  
• Decrease heart rate and slowed breathing  
• Decrease blood flow to extremities  
• More common in females  
• More common with young children |

### Threat Response Symptoms

<table>
<thead>
<tr>
<th>Hyperarousal</th>
<th>Dissociation</th>
</tr>
</thead>
</table>
| • Hypervigilance  
• Impulsivity  
• Rapid pulse  
• Freeze  
• Flee  
• Fight | • Avoidant  
• Numbness  
• Compliant  
• Suspension of time  
• Psychotic symptoms  
• Fainting  
• Catatonia |

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So what can we do?
### Functional IQ

<table>
<thead>
<tr>
<th>Functional IQ</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>110-100</td>
<td>100-90</td>
<td>90-80</td>
<td>80-70</td>
<td>70-60</td>
<td></td>
</tr>
</tbody>
</table>

### Sense of Time

<table>
<thead>
<tr>
<th>Sense of Time</th>
<th>Extuned</th>
<th>Hours</th>
<th>Minutes</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>70-90</td>
<td>90-100</td>
<td>101-110</td>
<td>111-135</td>
</tr>
</tbody>
</table>

### Hyperarousal Continuum

<table>
<thead>
<tr>
<th>Hyperarousal Continuum</th>
<th>Rest</th>
<th>Vigilance</th>
<th>Resistance</th>
<th>Defense</th>
<th>Aggression</th>
</tr>
</thead>
</table>

### Dissociative Continuum

<table>
<thead>
<tr>
<th>Dissociative Continuum</th>
<th>Rest</th>
<th>Avoidance</th>
<th>Compliance</th>
<th>Dissociation</th>
<th>Fainting</th>
</tr>
</thead>
</table>

### Primary Secondary Brain Areas

<table>
<thead>
<tr>
<th>Primary Secondary Brain Areas</th>
<th>NEOCORTEX</th>
<th>SUBCORTEX</th>
<th>LIMBIC</th>
<th>MIDLIMB</th>
<th>BRAINSTEM</th>
</tr>
</thead>
</table>

### Cognition

<table>
<thead>
<tr>
<th>Cognition</th>
<th>Concrete</th>
<th>Emotional</th>
<th>Reactive</th>
<th>Reflexive</th>
</tr>
</thead>
</table>

### Mental State

<table>
<thead>
<tr>
<th>Mental State</th>
<th>Calm</th>
<th>Alert</th>
<th>Alarm</th>
<th>Fear</th>
<th>Terror</th>
</tr>
</thead>
</table>

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Stage-Sensitive Desensitization

Stage-Focused Interventions

Cognitive
- Four Functional Domains
- Because the brain develops sequentially, early trauma can affect subsequent stages of neurodevelopment.
- Dysregulation “shuts down” the upper part of the brain making cognitive (“top-down”) strategies ineffective.

Relational
- Target limbic system (emotion, behavior, motivation)
- Relational interventions help build skills and develop a potential for co-regulation
  - Co-regulation – allows a dysregulated child to “borrow” a stable adult’s cortex in crisis
- Help to fill developmental gaps – attachment, attunement, relational reward (associations)
- Activities should start small and increase relational demand
  - Parallel, partners, group, large group, competitive

Regulatory

Sensory Integration

Relational Interventions

- Target limbic system (emotion, behavior, motivation)
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Relational Interventions

- “Copy Cat,” mirroring activities, finding eye-contact
- Low-risk games, cooperative games (knee tag; hot/cold; multiplayer thumb war)
- Group drumming
- Class cheers, affirmative word activities
- Co-op puzzles, Legos, Link’n Logs, side walk chalking
- Board games, cooperative sports, student leaders
- Stage sensitive – minimal competition at first

Regulatory Interventions

- Activities often overlap two or more target domains
- Regulatory interventions help to “quiet” the stress response system
- Lower a child’s baseline arousal state
  - Rhythmic activities are regulating
    - Tied to mother’s heart beat, our breathing, and even our cycles of brain waves
  - For an attached child, relationships are regulating
    - Co-regulation with people or animals

Regulatory Interventions

- Physical activity, running, walking
- Guided imagery – systematically strengthen ability to focus
- Breathing exercises
- Creative arts
- Frequent quiet breaks
- Music can affect emotional state and improve cognitive function – bpm can energize or calm
Sensory Integration

- Reinforce underdeveloped sensory pathways
- Underdeveloped sensory integration and processing can lead to distortion of stimuli and dysregulation
  - e.g. Vestibular system connected to Vagus nerve which is connected to stomach and nausea sensations
- Sensory integration problems can lead to an inability to categorize and filter incoming stimuli
- Hypersensitive vs. Hyposensitive

Sensory Integration

- Limit stimuli for hypersensitivities
- Vestibular – calming front to back rhythmic moving, rocking, swinging, trampoline, left/right identifiers, spinning/rolling activities,
- Proprioceptive – weighted blankets, hugs, hold 5 lb object to chest, stretch bands, jump rope, designated “pace space,” exercise ball, Lycra “straight jacket”
- Tactile – soft consistent textures, head massagers, sand box, fidget tools, bean bag chair, brushes
- Olfactory – direct path to amygdala – essential oils (not synthetic),
- Vision – limiting visual stimuli, exercising eye movement

Take-Aways

- “Children do well if they can.”
- “Skill not will”
- All behaviors serve a purpose (adaptive or maladaptive).
- Expectations should be developmentally (stage) sensitive no matter the child’s chronological age
- “Regulate, relate, reason”
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