How Trauma Affects the Developing Brain

Part 1

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STRESSFUL EVENT

GROWING UP IN A MILDLY BAD ENVIROMENT CHANGES OUR BIOLOGY

- Hyperarousal
- Depression
- Rapid Heart Rate
- Sleep Problems
- Cortisol Rushes
- Disturbed Brain Dev.
- Fearfulness
- Attention Focusing
- Drug/Alcohol Abuse
- Suicide
- Eating Disorders
- Panic Attacks
- Learning/memory
- Aggressiveness
- Criminality/Violence
- Shyness
Other Biological Changes

- Increased Muscle Tension
- Low Grade Temperature
- Increase Startle Response
- Affect Regulation Problems
- Hypervigilance

- Bed Wetting
- Disregulation of Body Function (soiling, wetting, vomiting)
- Abnormal EEG (cortical, hippocampal, limbic)
- Smaller Cerebral Volumes

Impact of Social-Emotional Trauma

NORMAL       PTSD
Alcohol
- Miscarriage
- Poor Nutrition
- Liver Damage
- Irregular Heart Beat
- Early Birth
- Low Birth Weight
- Deformed Face, Limbs
- Brain and Heart Damage
- Deformed Ear, Limbs
- Addiction, Withdrawal

Caffeine
- Miscarriage
- Lack of Sleep
- Faster Heart Beat
- Birth Defects
- Birth Defects
- Birth Defects
- Birth Defects

Tobacco
- Miscarriage
- Early Birth
- Anemia
- Bleeding Problems
- Still Birth
- Low Birth Weight
- Small Body
- SIDS

Pregnancy and Common Drugs

Mother

Alcohol
- Miscarriage
- Poor Nutrition
- Liver Damage
- Irregular Heart Beat
- Early Birth

Caffeine
- Miscarriage
- Lack of Sleep
- Faster Heart Beat

Tobacco
- Miscarriage
- Early Birth
- Anemia
- Bleeding Problems

Infant

Alcohol
- Low Birth Weight
- Deformed Face, Limbs
- Brain and Heart Damage
- Deformed Ear, Limbs
- Addiction, Withdrawal

Caffeine
- Birth Defects
- Birth Defects
- Birth Defects
- Birth Defects

Tobacco
- Still Birth
- Low Birth Weight
- Small Body
- SIDS
### Cocaine/Crack
- Miscarriage
- Lower birth weight
- Increased risk of infection
- Low head and brain
- Crib death

### Heroin
- Slower heart rate
- Slower breathing
- Increased risk of infection
- Decreased oxygen
- Low birth weight
- Small head
- Addiction, withdrawal
- Crib death

### Marijuana
- Miscarriage
- Early birth
- Forgetfulness
- Slowed reaction time
- Increased risk of infection
- Low birth weight
- Small head
- Short attention span

### PCP/LSD
- Miscarriage
- Missed heart rate
- High blood pressure
- Changed thinking
- Damaged eyes
- Behavior problems
- Small brain

### Speed
- Miscarriage
- Miscarriage
- Moving from calm to terror
- From being at rest to flight/fight

### Adaptive Response to Trauma

- Traumatic Experiences Alters How We Think!!!

1. Changes in Mental States
   - Moving from Calm to Terror
   - From being at Rest to Flight/Fight
Adaptive Response to Trauma

1. Changes in Mental State
2. Changes to Heart Rate
3. Changes to Functional Age

<table>
<thead>
<tr>
<th>Developmental Stage</th>
<th>Ages</th>
<th>30 ≤ 15</th>
<th>15 ≤ 8</th>
<th>8 ≤ 3</th>
<th>3 ≤ 1</th>
<th>1 ≤ 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary secondary Brain Areas</td>
<td>NECROCENT</td>
<td>Somatic</td>
<td>Sensory</td>
<td>Limbic</td>
<td>Limbic</td>
<td>Limbic</td>
</tr>
<tr>
<td>Cognition</td>
<td>Abstract</td>
<td>Concrete</td>
<td>Emotional</td>
<td>Reactive</td>
<td>Reflexive</td>
<td></td>
</tr>
<tr>
<td>Mental State</td>
<td>CALM</td>
<td>ALERT</td>
<td>ALARM</td>
<td>FEAR</td>
<td>TERROR</td>
<td></td>
</tr>
</tbody>
</table>
DIFFERENTIAL RESPONSE TO THREAT

<table>
<thead>
<tr>
<th>Dissociation</th>
<th>Hyperarousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached</td>
<td>Hypervigilance</td>
</tr>
<tr>
<td>Numb</td>
<td>Anxious</td>
</tr>
<tr>
<td>Compliant</td>
<td>Reactive</td>
</tr>
<tr>
<td>Decrease heart rate</td>
<td>Alarm response</td>
</tr>
<tr>
<td>Suspension of time</td>
<td>Increased heart rate</td>
</tr>
<tr>
<td>De-realization</td>
<td>Freeze: Fear</td>
</tr>
<tr>
<td>Mini-psychoses*</td>
<td>Flight: Panic</td>
</tr>
<tr>
<td>Fainting</td>
<td>Fight: Terror</td>
</tr>
</tbody>
</table>

INCREASED RISK
(Prolong the Intensity or Duration of the Acute Stress Response)

<table>
<thead>
<tr>
<th>Event</th>
<th>Individual</th>
<th>Family and Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple or repeated event (e.g., domestic violence or physical abuse)</td>
<td>Female</td>
<td>Trauma directly impacts caregivers</td>
</tr>
<tr>
<td>Physical injury to child</td>
<td>Young age</td>
<td>Anxiety in primary caregivers</td>
</tr>
<tr>
<td>Involves physical injury or death to loved one, especially mother</td>
<td>Subjective perception of physical harm</td>
<td>Continuing threat and disruption to family</td>
</tr>
<tr>
<td>Seeing dismembered or disfigured bodies</td>
<td>History of previous exposure to trauma</td>
<td>Chaotic, overwhelmed family</td>
</tr>
<tr>
<td>Home, school, or community destroyed</td>
<td>No cultural or religious anchors</td>
<td>Physical isolation</td>
</tr>
<tr>
<td>Perpetrator is a family member</td>
<td>No shared experience with peers (experiential isolation)</td>
<td>Distant care giving</td>
</tr>
<tr>
<td>Long duration (e.g., flood)</td>
<td>Pre-existing neuropsychiatric disorder (especially anxiety related)</td>
<td>Absent caregivers</td>
</tr>
</tbody>
</table>

DECREASED RISK

<table>
<thead>
<tr>
<th>Event</th>
<th>Individual</th>
<th>Family and Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Event</td>
<td>Cognitively capable of understanding abstract concepts</td>
<td>Intact nurturing family</td>
</tr>
<tr>
<td>Perpetrator is a stranger</td>
<td>Healthy coping skills</td>
<td>Support</td>
</tr>
<tr>
<td>No disruption of family or community structure</td>
<td>Educated about normative post-traumatic responses</td>
<td>Non-traumatized caregivers</td>
</tr>
<tr>
<td>Short duration (e.g., tornado)</td>
<td>Immediate post-traumatic interventions</td>
<td>Caregivers educated about normative post-traumatic responses</td>
</tr>
<tr>
<td></td>
<td>Strong ties to cultural or religious belief system</td>
<td>Strong family beliefs</td>
</tr>
</tbody>
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### Neurobiology of Trauma

- **BRAIN FUNCTION REFLECTS OUR EXPERIENCE**
- **REGRESSION MOVES THE LOCUS OF CONTROL DOWNWARD.**
- **THINKING TO FEELINGS TO REACTING**
- **NEUROSYSTEMS ACTIVATED = CHANGES TO REFLECT THAT PATTERN OF ACTIVATION**
- **ADAPTIVE MODES CHANGE WITH AGE**
- **SIMPLE ACT OF DIRECT QUESTIONING PRODUCES LOW LEVEL AROUSAL.**

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### Functions by Developmental Age

<table>
<thead>
<tr>
<th>Brain Region</th>
<th>Functions/Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attention/Focusing/Impulsivity</td>
</tr>
<tr>
<td></td>
<td>Self-Regulation/Arousal/Irritability/Startle Response/Vigilance</td>
</tr>
<tr>
<td></td>
<td>Fear States</td>
</tr>
<tr>
<td></td>
<td>Flexibility of Stress Response</td>
</tr>
<tr>
<td>Brainstem</td>
<td>Interpreting Social Behavioral Information: - Arousal/Emotional/Behavioral/Emotional Attention</td>
</tr>
<tr>
<td></td>
<td>Feeding/Appetite/Thirst/Sexual Drives</td>
</tr>
<tr>
<td></td>
<td>Coordination/Balance</td>
</tr>
<tr>
<td></td>
<td>Motor Regulation/Sequencing and Motor Control (Fine Motor)</td>
</tr>
<tr>
<td>Limbic</td>
<td>Diencephalon/Cerebellum: - Regulation of Sleep - Fight/Flight Response - Feeding/Appetite/Thirst/Sexual Drives</td>
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THANK YOU: Use this knowledge to help those who can’t help themselves.