Arousal Regulation in Traumatized Children

Sensorimotor Interventions

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The Problem

• Compromised Regulatory Capacity
• Rapidly shifting states of arousal, affect, thinking and behavior
• Challenges healing in outpatient trauma treatment.
• Limits integration of gains into daily life.

Trauma as a State Change Disorder

• "Certain psychiatric disorders can be conceptualized as "state change" disorders, in that a major pathophysiological component of the disorder comes from a dysregulation of the state change process."
• Trauma disorders can be seen as problems in maintaining states relevant to context, and in smooth state shifting.

Frank Putnam (1994)

Developmental Trauma In Children

• Developmentally-adverse interpersonal trauma and maltreatment includes:
  – Emotional abuse
  – Neglect
  – Attachment disruptions
  – Physical abuse
  – Sexual abuse

Supporting Individuals and Institutions

• Trauma Center: Bessel van der Kolk MD, Joe Spinazzola Ph.D., Alex Cook Ph.D. and the Trauma Center Clinicians and Clients using the SMART room
• Susan Miller and the ANS Foundation
• Adam Cummings of the Cummings Foundation
• The Occupational Therapy Associates and The Spiral Foundation
• The Sensorimotor Psychotherapy Institute and Pat Ogden Ph.D.

Co-occurring Symptoms

Interpersonal Trauma and Attachment Disruption

Alterations in Attention & Consciousness

Affect & Impulse Dysregulation

Interpersonal Difficulties

Distortion in Self-perception & Meaning-making

Somatization & Biological Dysregulation
Key developing regulatory biological systems impacted by Interpersonal Trauma

- Central Nervous System
- Hormonal regulation appear
- Structural and functional abnormalities in PFC
- Hippocampus
- Amygdala
- Cerebellar Vermis
- Volume and density of Temporal Lobes, corpus callosum, and PFC cortices

Understanding States

1. States are discrete and discontinuous
2. States are self-organizing and self-stabilizing
3. State changes constitute non-linear changes in:
   a) affect,
   b) access to memory
   c) attention & cognition
   d) regulatory physiology
   e) sense of self

Understanding States Cont’d.

1. In normal development, state changes are co-regulated with changes in state becoming smoothed out over the course of development. Putnam
2. States become traits: “if the neurobiology of a specific response, Hyperarousal or Dissociation, is activated long enough, there will be molecular, structural and functional changes in those systems.” Perry

State Shifts

Categories of Change

Affect: shift in mood or feeling evident
Thought: beliefs, content of thoughts, tone, pace, memory,
Behavior: change in intensity, size of movement, quantity, organization
Sense-of-self: how they see themselves
Consciousness: widens or narrows, diffuse or focused

States of Organization

- Startle
- Focused
- Rest/calm
- Excited/Engaged
- Exploration/Play
- Angry
- Calm, Soothed

The Modulation Model

- Sympathetic Arousal: high activation
- Parasympathetic Arousal: low activation
- Overload: frozen, emotionally reactive, Racing thoughts, hyperarousal, impulsive, aggressive
- Numb, lethargic, collapsed, cognitively slowed, Psychomotor retardation.

Ogden and Minton (2000)
Two Prominent States of Organization to Interpersonal Trauma Exposure

**Hypoarousal**
- Optimal Arousal Zone
- Parasympathetic Arousal: low activation
- Window of Tolerance

**Hyperarousal**
- Optimal Arousal Zone
- Sympathetic Arousal: high activation

The Modulation Model

Sources: Perry, Ogden (2007)

Examples of Change in States

**Affect:** shame, anger
**Thought:** "I'm a screw up, this is unfair."
**Behavior:** hitting running away
**Sense of Self:** I am bad, I'm broken
**Consciousness:** hyperfocused, narrow, rigid

**Arousal:** Reactive. Racing Thoughts, hyperarousal, impulsive, aggressive

**Affect:** joy and pleasure
**Thought:** "This is fun. I'm good at this."
**Behavior:** increased, sustained effort
**Sense of Self:** I'm competent, I can do this
**Consciousness:** focused and flexible

**Arousal:** Overload. Emotional, emotionally frozen, emotionally numb, lethargic, collapsed, Psychomotor retardation

Sources: Perry, Ogden (2007)

Neurological, Behavioral, & Relational Dysregulation Evident in Children who Experience Interpersonal Trauma

1. **Rapid Oscillations**
2. **Narrow Window**

Functionally an inability to integrate information effectively on a cognitive, emotional or sensorimotor/body level

Sources: Ogden and Minton (2000), Siegele (1999)

Developmental Hierarchy of Regulatory Capacity

**Cognitive Skills**
- Reading, writing, spelling
- Concentration, problem solving
- Creativity

**Foundational Skills**
- Motor: oral, hand, body, eye
- Perceptual: auditory, tactile, spatial, visual, kinesthesia
- Emotional: feelings of adequacy, mastery of environment

**Body-based Functions**
- Homeostasis, reflex maturation, postural control, balance, body scheme, bilateralism, gravitational security, motor planning

**Sensory Foundation for Regulation & Development**
- Touch, vision, hearing, movement, gravity, smell, taste, temperature, pain, body chemistry, internal sensation

Adapted from Ayres, 1979; and Koomar, 2008

Corresponding Neuronal Development

Sources: Perry, Ogden (2007)

See Appendix for Full View

Slide by Professor Youngon Choi, Skidmore College

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**Existing Child Paradigms**

Treatments impacting these primary Arousal regulation systems of the brain-body.

**S.M.A.R.T.**

Sensory Motor Arousal Regulation Treatment

A comprehensive treatment approach that is organized to support arousal regulation in traumatized children by integrating:

**S.M.A.R.T. The Treatment Room**

- Treatment occurs in a room adjusted to support physical movement and sensory experiences
- Treatment engages the biologically based systems of the body for regulation & healing
- Treatment provides the child a new experience of the co-regulation of traumatic arousal and affect
- Treatment expands the child’s capacity for new behaviors and regulation in the face of life stressors and trauma triggers

**Adaptations to Traditional Treatment Space**

- Adding large gym mat to cover floor space
- Minimize furniture to allow for freedom of movement and exploration
- Provide specific sensory integration tools (see slide 23)
- Provide art and symbolic play materials
- Recommend video capacity for review of the non-verbal material in the treatment

**Sensory and Movement Supplies**

- Weighted Blankets
- Large Pillows
- Crash Cushions
- Womb Space:
  - Spinning Board
  - Rubber tubing for pulling or pushing
- Small Trampoline
- Therapy Balls
- Balance Beams
- Spandex Body Socks
- Bean Bags
- Stepping stones
- Weighted balls

**SMART ROOM Photo Album**

See additional file for detailed photos of the Trauma Center SMART Room
Occupational Therapy (OT) Practice Framework

Support health and participation in life through engagement in occupation e.g. play, leisure, daily living activities, work, schoolwork, etc.

Address:
- Sensory-perceptual skills
- Motor and praxis skills
- Emotional regulation
- Cognitive skills
- Communication and social skills

American Occupational Therapy Association (2008)

The Hidden Senses Inside

- Sense of balance – inner ear, vestibular, picks up movement and position of the head
- Sense of our body scheme – muscles and joints, proprioception – stimulated by movement of our bodies
- Our gut sense, visceral, information from our bodily center, part of the intuitive knowing system
- In Sensorimotor Trauma therapy clinicians learn to track these hidden senses as part of the ‘organization of the client’s experience

Sensory Integration Therapist Skills

Drawn from the Fidelity Measure for OT Sensory Integration Intervention

- Provide opportunities for sensory based activities to promote regulation of arousal level, attention and emotion
- Collaborate in activity choice
- Support the child’s intrinsic motivation to play
- Tailor the activity to the “just right” challenge
- Ensure activities are successful Foster therapeutic alliance

Parham, Cohn, Spitzer, Koomar, et al, 2007

Diagnostic Consideration: Sensory Processing Disorders in Traumatized Children

- Traumatized children may have neurological immaturity, known as sensory processing disorder (SPD) e.g. heightened sensitivities and/or decreased body awareness often resulting in poor postural control, timing and rhythmicity.
- A child with SPD may have less resiliency due to multiple problems that interfere with development
- Consider utilizing the Sensory Processing Measure (SPM), a simple parent report tool, that can assist assessing whether a referral for an OT sensory integration based assessment is necessary

Wisdom from Sensorimotor Psychotherapy

- Modulation Model
- Working with Core Organizers
- Facilitated State Change
- Bottom Up Regulation
- Arousal cycle
- Transformation at the Sensorimotor level will result in higher level change in the system

Parham, Cohn, Spitzer, Koomar, et al, 2007
Sensorimotor Therapist Skills

- **Tracking**: learning to observe the non-verbal cues
- **Contact**: verbally contacting what one tracks
- **Mindfulness**: a state of conscious attending to the present moment as it unfolds
- **Curiosity**: an attitude of open mind
- **Collaboration**: getting the child's collaboration in the process
- Understanding truncated orienting and defensive responses
- Skills for sequencing arousal in the body as a result of trauma

The Modulation Model

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  - Psychomotor retardation

Ogden and Minton (2000)

How to bring the Body into Focus in Arousal Regulation

**Old**
- Talk about
- Interpret
- Fail to interrupt habitual patterns

**New**
- Observe & Describe
- Curious and Mindful
- Support new actions

Porges’ Social Engagement Theory

- The Vagas
  - Three layers of the Vagas system that reveal the 3 levels of trauma response
  - Hierarchial in development and use, default to more primitive to survive

1 2 3

Young Girl in her Window

Language of thought and verbal expression

Frontal Cortex

Language of emotion and feeling tones

Limbic System

Language of body sensory and impulses

Brainstem

Fisher, 2003; Ogden, 2006

Two Boys Outside the Window

Frontal Cortex

Limbic System

Fisher, 2003; Ogden, 2006

Threat

Brainstem
The Arousal Cycle & Sensory Satiation

High level of arousal, has natural peaking, approaches the top of the Window of Tolerance

Sensory seeking: strong input or output

Completion: a settling and resolution of the sensations and/or movement

Task to support the natural course of the Arousal Cycle through satiation or completion, allowing sense of mastery or fulfillment

Wisdom from Attachment World

- Co-regulation of arousal & affect
- The biological imperative to attach

- Protective & healing properties attachment provides against trauma
- The devastating effects when the Caregiver is the source of fear and danger

Engaging Regulation Skills to Change Behavior

- Diminish autonomic arousal: first via facilitated or co-regulation then increasing the child’s self-regulation skills
- Enhance emotional expression: focus on mindful awareness of feelings and body sensations, labeling them rather than interpreting them, inhibiting impulsivity, developing thoughtful and adaptive responses to traumatic activation
- Increase cognition: engaging cortex for down regulation
- Focus on strengths: emphasis on facilitating experiences in which arousal is optimal; using resources as a way to increase the window of tolerance for stress and affect

Adapted from Saxe

Two Modes of Regulation

Co-Regulation involves the ability to utilize relationships to either stimulate or calm, keeping one’s self inside the window of tolerance. Because we finish so much of our development after birth, we are dependent upon regulation from others to survive as well as develop.

Auto-regulation is the ability to self-regulate, independent of other people. It is the ability to calm oneself down when arousal rises to the upper limits of the window of tolerance or to stimulate oneself when arousal drops to the lower limits. It’s built from co-regulating experiences.

Regulating State Changes Using the Modulation Model

1. Where are the child & I in the Window?
2. What are the indicators?
3. How do I use this information to adjust my contact to be regulating?

Co-Regulating Child’s State of Arousal: Use of Self

- Matching Vitality Affect
- Match tone
- Match intensity
- Match prosody
- Don’t match the emotion

Dan Hughes 2007
Co-Regulating Child’s State of Arousal: Use of Equipment

- Fight impulse: Pushing, deep touch pressure
- Flight Impulse: Run, jump, proprioceptive input,
- Freeze/Hide Impulse: womb space, body sock, covered up
- Attach Impulse: interactive, held, rocking, rhythmic interaction, deep touch pressure
- Dissociate, submit; standing up, orienting, grounding input to arms and legs, engaging core, spine, breath

Importance of Touch in Regulation Work

- Touch can provide calming and grounding sensations, creating a felt sense of safety and can also be used to provide physical cues to assist in task execution.
- Touch can also be triggering, thus one must possess an understanding of the potentially traumatic effects of touch for trauma clients
- Therapists must gain comfort and an understanding of mindful use of touch to employ these methods
- Having caregivers present in the room or instructed to be the ones to provide the close touch is one way to increase comfort and safety around touch
- Use of SI equipment can provide clinicians with a way to administer contact without direct touch

Tools for sensory seeking behaviors: Containment and Regulation

Film demonstrated
- Sandwich between two pillows
- Wrapped in a blanket
- Use of weighted blanket
- With caregiver, practice safe touch, holding and hugs

Proprioceptive Tools: Fight/Flight responses and Regulation

Film Demonstrated:
- Trampoline jumping
- Tug o’ war
- Body sox
- Bouncing on a fitness ball
- Crawling through a tunnel
- Pushing against pillows

Strong Proprioceptive input such as pulling and pushing, or jumping or bouncing can bring the arousal system into an optimal state of alertness.

Vestibular Tools: orienting, flight and regulation

Film Demonstrated:
- Balance beam
- Astronaut board
- Physio-ball
- Balance board
- Yoga poses
- Spinning

These activities stimulate the neurological systems for knowing where one is in space
Support physiological capacity to orient to surroundings, essential to evaluating safety. May have been truncated by trauma
Strong vestibular input can be grounding and regulating

Rhythm Tools Engaging the child’s natural organization

Film Demonstrated:
- Bouncing to a beat
- Bounce-and-clap
- Ball toss in a rhythm
- Rocking on a dolphin pillow
- Repetition of a child generated movement to a beat

Rhythmic movement fosters organization
Rhythmic movement brings the child into attunement or better interpersonal contact with others
Interactive rhythm regulates nervous systems
Movement activates the cerebellum and hence the limbic system through neuronal connections.
### State Change Through Simple Movement Activities

Observations from infancy, ordinary play and the SMART room

- **Standing up** can change alertness
- **Rocking** can be soothing and calms the nervous system
- **Jumping** can alter arousal and calm the child
- **Contact comfort**, if done correctly, calms and soothes arousal

### Discoveries that intrigue us

With improved arousal regulation in the context of a safe relationship children show:

- Better identification and expression of basic needs (e.g. thirst, touch)
- Greater cognitive organization
- Improved verbal communication
- Increased symbolic play in younger children
- Improved problem solving
- Greater expression of feelings
- Greater self observation
- Increased social engagement
- Greater empathy
- Greater awareness of the mind of others

### Our Most Powerful Observation

….. and often children spontaneously begin to express their trauma narrative with startling clarity, younger children through dramatic and symbolic play, and older children through a verbal narrative that allows us to understand their experience and better help them heal from the trauma.

### References

- Ayres, J. (1973) Sensory Integration and Learning Disorders. Western Psychological Services, California.
- Hughes, Daniel, Attachment Focused Family Therapy, 2006.
- Perry, Bruce The Boy Who Was Raised as a Dog, 2006.
- Saxe, Ellis, Kaplow, Collaborative Treatment of Traumatized Children and Teens, 2007
- Shonkoff, J.& Phillips, D, “From Neurons to Neighborhoods”, Zero to Three, April/May 2001
- Siegel, Dan [http://drdansiegel.com/] PPP Parenting with the Brain in Mind, 2005.

**Resources**

**Therapeutic Materials**
- Abilitations, Kinetic Kids (800) 850-8602 www.abilitations.com
- Achievement Products (800) 373-4699 www.achieveproducts.com
- Sensory Comfort (888) 436-2622 www.sensorycomfort.com
- Southpaw Enterprises (800) 228-1698 www.southpawenterprises.com
- Therapro (800) 257-5376 www.theraproducts.com
- Weighted Wearables (715) 235-1611 www.weightedwearables.com
- Sensory Processing Information for Adult Mental Health www.ot-innovations.com
- OTA/Watertown’s Treatment Equipment Manual
  Detailed instructional booklet on how to build your own SI equipment. For more information or to order, contact: admin@otawatertown.com (617) 923-4410 www.otawatertown.com

**Web Sites**
- www.traumacenter.org
- www.childtrauma.org
- www.attachmentparenting.net
- www.cyc-net.org/reference/refs-attachmentdisorders.html
- www.otawatertown.com
- www.ot-innovations.com