When Chronic Maltreatment in Childhood Closes the door to Psychotherapy, Animal-Assisted Psychotherapy Opens a Window: Interpersonal Neurobiology of Trauma and AAP

Nancy Parish-Plass
Developmental Trauma
van der Kolk

* Chronic maltreatment
  - abuse (emotional/physical/sexual)
  - neglect (emotional/physical/educational)
  - witnessing domestic violence

* Onset in early childhood

* Perpetrated by someone older than the child, usually within the caregiving system
Interpersonal Neurobiology

The brain develops in the context of the interpersonal world
Relationships and interpersonal experiences

Development and functioning of the neurobiological system

The quality of relationships and interpersonal interactions
Neural Damage
Caused By Developmental Trauma

Experiences of chronic interpersonal trauma affect the HPA (hypothalamic pituitary adrenal) axis

1) higher baseline of cortisol release
   -> chronic state of physiological stress, anxiety, vigilance
Neural Damage Caused By Developmental Trauma

Damage to neural fibers, synapses and tissues

Injury to, or impediment of the development of integrative areas of the brain

Disruption of information transfer and communication between brain regions, neural systems
Neural Damage (con’t)

Implications of lack of integration between parts of the brain

• Separation between cognition (cortex) and emotion (limbic system)
  -> The child operates out of the lower brain
  -> defensive behavior

• Sensory-motor difficulties, physical symptoms

• Problem-solving strategies that are primitive, inappropriate
Neural Damage (con't)

Implications of lack of integration between parts of the brain

- Emotional, cognitive, sensory and behavioral dysregulation
- Inability to self-sooth
- Chaos – lack of self-control, unpredictability, flooding, intrusiveness
- Difficulty
  - describing and expressing emotions
  - recognizing and describing internal states
  - expressing needs and desires, inner world
Neural Damage (con’t)

Implications of lack of integration between parts of the brain

- Negatively influences numerous neural systems responsible for cognition
  - Dysregulation in the upper brain

- Difficulty processing incoming information, organizing thought, recognizing emotional states

- Difficulties in attention and concentration - NOT ADHD
Neural Damage (con’t)

Implications of lack of integration between parts of the brain

• Disconnection between the amygdala (implicit memory) and hippocampus (explicit memory)
  
  → implicit memory not translated to explicit memory
  → child responds to unexplained sensory and behavioral reactions and body memory, not language and conscious thinking
  → no words to express experiences, emotions to self or others
  → difficulty constructing a meaningful narrative
Neural Damage (con’t)

Implications of lack of integration between parts of the brain

• Disorganization of neural systems mediating social-emotional functioning
  -> difficulty in successful engagement with others
  -> difficulty reading social cues, mentalizing

• Insecure (avoidant) or Disorganized Attachment
Neural Damage
Caused By Developmental Trauma

Experiences of chronic interpersonal trauma affect the HPA (hypothalamic pituitary adrenal) axis

2) lower levels of oxytocin and oxytocin reactivity
   - less trust in others
   - less emotional sharing
   - less social affiliation
   - lower ability to reduce fear response
   - lower ability to manage stress and anxiety
   - Long-term disruptions in ability to be calmed and soothed through social bonding interactions
Neural Damage
Caused By Developmental Trauma (con’t)

Implications of neglect:

Less stimulus
- fewer neural pathways
- less brain matter
- primitive strategies

*** Neglect may even cause MORE damage than physical abuse
Functional Neural Networks are Responsible for Connectivity in the Neurobiological System

Default Mode Network – DMN

* Highly overlapping network both in its functional and structural connectivity

* Facilitates observation and contemplation inwards, play, thoughts of the future, daydreaming, imagination, etc.
Default Mode Network (DMN)

Continues to function when we are in a resting state until a novel situation or possible threat arises, then calls us to turn our attention outwards

• Allows us the luxury of looking inwards while the DMN is ON GUARD

• Allows synthesis of sensory experience of body and internal world

• Allows conscious experience of ourselves in imaginal space

• Allows us to focus on our relationships
Default Mode Network (DMN)

🤔

The neurobiological parallel of

Winnicott

Potential Space
Trauma Damages Functional Neural Networks Responsible for Connectivity in the Neurobiological System

* The DMN becomes dysfunctional
* There is no alert mechanism in the case of a novel situation or threat
* The child must stay outwardly focused
* Potential space collapses
Polyvagal Theory (Porges)

Hierarchy of the neural system’s reactions to danger

Hierarch of Nervous System Response

- Fight/Flight
- Social Engagement
- Shutdown

Based on polyvagal theory by Stephen Porges
Copyright 2015 Dee Wagner
Polyvagal Theory (Porges)

Hierarchy of the neural system’s reactions to danger

**Neuroception** -

- Perception and evaluation of threat and safety at the level of neurological circuits with no cognitive awareness

- Stimulates the vagus nerve for defensive action
Dorsal Vagal Branch

* Primitive mechanism
* Reacts defensively in life-threatening situations
Ventral Vagal Branch
* In Mammals Only
* Allows us to seek safety through social engagement as a protective strategy
Social Engagement for Safety and Lowering of Anxiety
Allowing Contemplation and Self-Exploration

The neurobiological parallel of Bowlby – Theory of Attachment

Safe Haven
Secure Base
Movement along the ventral vagal nerve: A neural exercise strengthening the neural pathway to social engagement.
Developmental Trauma

Disuse of the ventral vagal branch results in its atrophy

Chronic release of cortisol damages the ventral vagal branch

Social Engagement for safety is no longer an option
Psychological Implications

• Lowered ability to trust others
• Negative self-image
• Low self-esteem
• Unpredictable Self
• Shame
• Guilt
Goals of Psychotherapy for Developmental Trauma

1) Establishment of the Therapeutic Alliance
   healing relationship in therapy characterized by:
   * attunement -> feeling felt by therapist
   * sense of safety
   * healthy relationship model

“The therapeutic relationship may be an especially ‘active’ ingredient in the remediation of childhood abuse-related PTSD”

Cloitre, Stovall-Mclough, Miranda, & Chemtob
Goals of Psychotherapy for Developmental Trauma (con’t)

2) Recognition of the trauma itself, finding the words, processing the trauma (implicit -> explicit) -> formation of a meaningful narrative

3) Regrowth of neural connective tissue, or linkage
   -> Integration within the neural system
   -> regulation and ability to express oneself
How Can We Repair the Damage?

PLAY

Play is considered to be CRITICAL in healing the brain and regrowth of brain tissue and fibers

* Facilitates BEING instead of DOING
* Facilitates contact with implicit memories/knowledge
* Helps working through implicit memories/knowledge through imagination
  -> formation of explicit memories
Repair the Damage - Play (con't)

Imaginative play
- working through parts of inner world
- coherent and meaningful narrative
  - regrowth of connecting fibers between parts of brain
- neurological integration
- communication between parts of brain
- parts of brain function as a system
Repair the Damage - Play (con't)

Practicing relationships

- neural exercise
- interpersonal regulation and connection

Play calms down the whole neurobiological system and leads to regulation and the ability to develop emotionally and cognitively.
Repair the Damage – Play (con’t)

Play - form of self-exploration and expression of experiences, emotions, and thoughts that children may have difficulty, or have a fear of, verbalizing to others or even to themselves

Play Therapy – an attuned adult joining in the play and reflecting back to the child

-> client feels felt
-> client finds the words for experiences, emotions
Barriers to Psychotherapy Caused by Developmental Trauma

- Difficulty Establishing Therapeutic Alliance
- Collapse of Potential Space
- Deficit in ability to symbolize
- Inability to play
- Dysregulation in the therapy setting
- Shame and the presentation of False Self to others
- Loss of touch with Self
Barriers to Psychotherapy Due to Developmental Trauma (con’t)

• Neuroception of danger in the therapy setting activates the vagus nerve
  -> fight/flight, freeze, dissociation

• One is cut off from one’s inner emotional world

• Implicit doesn’t translate to Explicit
  -> Difficulty recognizing, processing the trauma
The Only Hope: Relationships!

The trauma happened in the context of relationships, so the healing MUST take place in the context of relationships.

Herman

Relationships and integrative interactions
- activation and growth of neural fibers, tissue, synapses

Relationships
- more efficient communications in the integrative areas of the brain

Social interaction
- flexibility, adaptability, flowing and dynamic coherence, energy, stability, health
Animal-Assisted Psychotherapy

Psychotherapy: same goals, unique medium

- Aliveness – reality at a safe psychological distance
- Facilitates symbolization
- A relational therapy par excellence – Laboratory of relationships
- Client is both participant and observer
Therapeutic Alliance in AAP

Research: Strong TA with avoidantly-attached children is established earlier in AAP

Interaction with animals lowers Cortisol
  → lowers anxiety in therapy, with the therapist

Interaction with animals raises Oxytocin -
  → trust, affiliation
  → social engagement
  → attachment security
  → immobilization w/o fear
Therapeutic Alliance (con’t)

• Less complex exchange of affection with animals
  -> sense of emotional safety with them

• State of safety
  -> perceptual bias toward the positive

• Cross-species neuroception
  -> animals interacting with therapist serve as cues of safety (Porges)

• Animals as a solution for alliance ruptures
  -> safe haven, secure base
Neurobiological and Psychological Effects in AAP: Expansion of the Potential Space

* Activity of right amygdala (through perception of animals) provides access to the client’s emotional world and their implicit memories

* Sensory stimulations (sights, smells, sounds) during interactions with animals activate client’s implicit memories

* Therapy environment perceived as safe
  - Raised content can be worked through
“She thinks I’m THE MAN”
Neurobiological and Psychological Effects in AAP: Expansion of the Potential Space

Interaction with animals lowers cortisol
  -> Lowers anxiety, blood pressure, heart rate

Animals in the therapy setting
  -> Safe Haven when anxiety arises from threatening content

Lower anxiety + feeling of safety
  -> Increases ability to be in touch with difficult content
  -> expansion of potential space
Anthropomorphism as Symbolization - Reality at a Safe Psychological Distance

• Oxytocin, released by interaction with animals -> anthropomorphic tendencies and attribution of social meaning

• Mirror neurons, activated by the movement of the animals, cause us to ascribe intentions to the animals

• Projection - We observe animal’s actions, interpret (or misinterpret) their intentions/emotions

Expansion of Potential Space
Animal’s Movement Stimulates Mirror Neurons

“Poor Mushu! Look at her. She’s so sad. She hasn’t had a hug from her mother for 8 years!

My mother hugs me all the time. I would never want to be without my mother’s hug. Poor Mushu!”
Anthropomorphism as Symbolization - Reality at a Safe Psychological Distance

Play with animals as symbolization, mediated by the therapist:

- Discovery of meaning for unexplained actions and emotions (implicit processed and transformed into explicit)
- Reconsolidation of implicit patterns and mental modes and creation of alternative neural pathways
- Neural linkage and integration, contributing to balance, reduction of anxiety, and regulation
- Facilitation of mentalization processes
“Mushu needs those pills because her heart is hurting because she misses Nana so much!”
“Do they make the heart pills like these for people?”

“My heart is hurting, too.”
Attaining the Ability to Self-Regulate

Interaction/social engagement with animals (and therapist)

-> growth of connective neurological fibers
-> more resilient neural system
-> neural exercise (practice) down-regulating fight/flight --> social engagement
-> ability to self-regulate
Attaining the Ability to Self-Regulate

Implicit transformed into explicit

- development of narrative
- integration of left/right hemispheres, lower/upper areas of brain, implicit/explicit knowledge and memory
- calming of the neural system
- increase of ability to self-regulate
Attaining the Ability to Self-Regulate (con’t)

• Mediation and reflection by therapist in interaction with animals
  -> “feeling felt”
  -> increases self-regulation

• Observing interactions between others (therapist-animal, animal-animal)
  -> ability to mentalize, reflect, interpret
  -> increases emotional regulation
Prevention of Dissociation

• Cross-species neuroception of safety due to cues of animals allows client to stay in touch with self

• Animals as cues of safety: Social engagement with therapist instead of fight/flight, freeze, dissociation

Porges
Prevention of Dissociation (con't)

• Activity of right amygdala (stimulated by animals) -> access to emotional world

• Relationship with the animal = anchor to emotional world

• Lower cortisol -> lower anxiety when in contact with emotional world
Prevention of Dissociation (con't)

- Research: Interaction with dogs
  - increased blood flow to the brain, activity in PFC
  - grounding, keeping in touch with self
  - prevents dissociation
Acceptance and Expression of True Self

* Therapist sees, accepts and cares for animals, who unapologetically express their true selves

* Client’s identification with animals
  - client likely to feel felt and accepted
  - acceptance of self without shame
  - expression of true self
Acceptance and Expression of True Self

• Play with animals:
  - implicit transformed into explicit
  - more self-understanding
  - deeper acquaintance with one’s real self
Healing Neurological Effects of the Therapist’s and the Client’s Altruistic, Caring and Compassionate Behavior

• Altruistic, compassionate behavior changes self-concept: helpless victim → helpful actor

• Altruistic behavior activates the ommpfc circuitry
  → stimulation of bonding and attachment
  → modulation of anxieties and fears
Bio-Behavioral Feedback Loop of Compassionate Behavior

- Compassionate care of an animal
- Rise in oxytocin
- More touch, contact within attachment relationship
- Trust, immobilization w/o fear, emotional sharing, regulation
Neurosequential Model of Therapeutics
Bruce Perry

Neurobiologically-Informed Therapy for Developmental Trauma

Working separately with individual parts of the brain
Gradually from Bottom-to-Top
NMT (con't)

Four Domains:

Sensory Integration - Brainstem
Self-Regulation - Diencephalon
Relationships and Emotions - Limbic System
Cognition - Cortex
WHERE / Dan Pagis

I hid in the room, but I have forgotten where.
I'm not in the cabinet.
And not behind the curtain.
And also not in the big fortress between the table legs.
The mirror is empty of me.
For a minute it seems to me that I am in the picture on the wall.
If one of these days someone will call me
I will answer and I will know:
Here I am.
Questions? Comments?

You are welcome to be in contact with me
nancyaat@gmail.com

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Animal-Assisted Psychotherapy Interpersonal Neurobiology of Trauma Nerds

See my publications
https://www.researchgate.net/profile/Nancy-Parish-Plass/research