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Identifying and Treating the Traumatized Brain, Part 1 of 3

Trauma, its sources and treatment, have become more visible and studied over the last ten years. We have learned that we can come to understand past trauma, to make peace with it, and to learn coping techniques for the emotional triggers that we have developed because of it. And we have learned how to learn from the past to create lives lived in safety and support.

At this critical moment in time, it is imperative that we begin to explore in more and more depth the neurobiology of trauma, so that we can address the central source wherein the trauma is stored, the brain itself. For it is only by addressing the central source of this problem that we can truly rid the brain of the specific damage caused by trauma in the hopes of leaving only a memory that has no power over the survivor.

Childhood trauma, as it is stored in the deep, preconscious brain, trauma that can be re-triggered and cause more trauma, is the subject of this exploration of the Developmental Sequence as it unfolds from prenatal development through the early years of life. The Developmental Sequence is the elegant progression of sensory and motor stages that both reflect the progression of brain growth and facilitate its integration.

For more than 30 years, NeuroDevelopmental Movement practitioners have studied and learned how trauma causes dysfunction in the central nervous system below the level of conscious awareness. We have also studied and learned how those disruptions in central nervous system functioning, which may be due to any number of causes, is a source of ongoing triggers of the trauma, or can be a source of trauma itself.

Over the time that I have been working with trauma, I have observed many approaches that have helped my clients make peace with their pasts, learn specific coping techniques, and make choices that are safe and supportive given their history.

However, our mission has been to go deeper, to explore and understand how trauma becomes wired into the brain, impacting the central nervous system and becoming re-triggered by the central nervous system, with most of these impacts and reactions being rooted in areas of our psyche that are unavailable to words, to language, to thoughts, rationality, justifications, even awareness of our feelings.

These traumas get built into the level of the brain, virtually, that grows our toenails, areas to which we have little access through many of the approaches we might want to use to resolve psychological challenges, entrenched, if you will, in almost the cellular structure of the brain itself.

The scope of this paper:

As we discuss the ways that trauma becomes wired into the brain, we will be initially starting at the level of the two and a half to three-month-old's levels of functioning, which we are describing as the pons level, because the pons, at the top of the brainstem, is the dominant brain during these early months.

This will be followed by a discussion of higher levels of the brain, specifically the mid-cerebrum or midbrain, and then we will go back to examine some of the most exciting, intriguing and least known areas of trauma work, resolving prenatal trauma. Finally, we will discuss the therapeutic tool that can access and resolve these traumas, that being the work known as NeuroDevelopmental Movement.

As we look at each level of the brain, we will be considering how the brain takes in information, including the development of visual, auditory, and tactile functioning.

And we will also be considering how the brain puts OUT information through gross motor activity, and fine motor and language skills.

This paper is the first of three parts in this exploration of trauma and the brain. To receive the second and third parts, please write to Bette Lamont at developmentalmovement@gmail.org

The Developmental Sequence

This phrase, Developmental Sequence, indicates the process by which the brain becomes available and how we grow from being a helpless infant to full adult functioning.

We come into the world, with rare exceptions, with a central nervous system present, intact, but unavailable. The brain becomes available by a process called myelination, the process of myelin growing up through, surrounding, and coating the central nervous system. Myelin is much like the plastic coating on the wiring to an appliance. Myelin protects the wiring and keeps it from short circuiting. Without it, signals cannot flow smoothly through the brain.

As myelin grows up through the brain, the skills of different levels of the brain become available to the infant and child. This happens naturally, but is also cued by the activity that is both prompted by that level of the brain and encourages organization in the functions of that level of the brain.

A myelinated brain that has not gone through the reflex, movement, and sensory experiences that are defined as the Developmental Sequence, will be a disorganized brain. The consequences of this disorganized brain can show up in deficits in physical adeptness, academic functioning, self-regulation, social skills, emotional balance, and ability to focus and attend, among other issues.

Thus reflex, movement, and sensory experiences are vital to an understanding of any challenges that frequently are cast as dysregulation, learning disabilities, or coordination problems, such as motor planning, poor social cueing, even mood states such as depression and anxiety, can be traced back to gaps in the Developmental Sequence.

When there is a gap in the original Developmental Sequence, the client can replicate the activities of that process and gain missing skills. In the case of injury, the brain can be prompted to make new connections by replicating the Developmental Sequence, with a subsequent change in social, emotional, physical, and academic functioning.

Our role as providers of appropriate trauma specialists is to understand how the brain is impaired by trauma, and replicate the healing provided by replicating the activities at the area of the brain impacted by that trauma.

Part one of this paper explores the level of the brain called the pons. Parts two and three, will explore mid-cerebrum trauma, cortical injury, and strategies for repair and recovery.

As we look at the pons level brain, we will be considering three sensory areas - visual, auditory, and tactile competence and three 'output' areas, those being gross motor/mobility skills, language development, and fine motor skills.

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Pons Developmental Level

Visual

Normal visual development:

This is the stage of development when the babies first concern is the human face. Between two and a half and seven months, when the pons level brain is dominant, the baby will gaze into the human face, seeking a burst of oxytocin and connection. Their eyes are drawn to the human face. Psychologists have noted that they are drawn to the outline – two eyes, nose, and mouth, in the specific arrangement of a human face. They also develop horizontal eye tracking specifically as a way to track their mother or caregiver moving about the space.

Disrupted development:

Lack of eye contact during this phase may be due to any number of factors, including an illness of the baby or the absence, physically or emotionally, of the mother or caregiver. A child who has had surgery and is confined in a hospital setting, early placement in an orphanage, or premature birth due to prenatal exposure to drugs and followed by time spent in a NICU, are examples of poor opportunities to create this bond visually.

On the other hand, a mother who is depressed, on drugs, or even unable herself due to trauma (or cell phone addiction) to make eye contact with the child, is also putting the attachment at risk.

The burst of oxytocin that the baby and mother receive from mutual eye gazing may be replaced by a burst of cortisol instead. Eye contact may become uncomfortable. The infant is making, in a sense, a hormonal 'decision' about whether the world is basically safe and supportive, or something against which one must constantly fight, or from which one must constantly withdraw or flee.

In terms of a trauma response, this is one of our earliest disruptions, wherein we cannot benefit from the natural nurturing of a parent or other beloved and instead have a sense of 'fending for oneself' in a world that lacks comfort. And babies do try to 'fend for themselves' by containing their needs, self-soothing, and protecting themselves against the very connections that might bring comfort and relief in the appropriate setting.

Resolution of this problem looks like:

Comfortable eye contact now becomes possible and they are willing to be nurtured. The child is more able to calm themselves. They can feel happy and safe with their family and their 'safe people', or on their own.

Auditory

Normal auditory development:

The baby startles at loud sounds that are perceived as a threat. This could be the dog barking, a smoke alarm going off, someone shouting in anger. All are perceived as threats whether or not they have the capacity or intent to harm the child.

Disrupted development:

When the normal Developmental Sequence has been disrupted, EVERYTHING can be perceived a threat and the baby lives in a chronic sense of startle, and a cortisol flooded brain.

Cortisol, as we have come to know, is a neurotoxin, and the infant who lives in constant alarm is damaging their brain through constant production of this toxic chemistry, adding to the initial trauma.

It is important at this time to consider the condition known as Sensory Processing Disorder. This pattern of responses has become more common since the middle of the last century and as a result, children present more dysregulated. We will be addressing dysregulation as part of the Sensory Processing Disorder phenomenon.

A Nod to Sensory Processing Disorder

Sensory processing is, we have observed, a skill that the infant learns from the parent. A child held in arms or on the mother's body will, when placed in a challenging sensory environment, learn from the metabolic, pulse rate, breathing patterns, and hormonal transference from the mother, the appropriate response to their sensory surroundings.

For example, a mother walking with a child in arms may be presented with a passing fire truck, sirens blaring, fast, red, loud, and big. The child in arms can feel that the mother has no physical signals of anxiety in her body. Her pulse and breathing remain steady and she remains overall calm. This can teach the child that there is in fact no reason to be distressed about the noise and chaos around her.

The child being pushed in a stroller in front of the mom who is passed by the same fire truck may have no way to understand the appropriate reaction to the extreme sensory input and may instead react with a huge surge of anxiety.

When this happens repeatedly, the child can easily develop hypersensitivities to visual, auditory, and tactile input and the resulting behavior is called Sensory Processing Disorder.

We NEED parents in the first year of life, not just to feed us, but also to teach us about the world. That teaching does not begin when we hold up a ball and give them the name for it. That teaching begins with the touch of our hands, the tone of our voice, and the regulation of our own nervous system and how it responds to the world. These are the first teachings.

In our current culture, the tendency to keep babies in equipment rather than on the parents' bodies creates a barrier to integrating sensory experiences and this is growing ever more common as we allow ourselves as parents to be distracted by cell phones, work, and overly busy lives from what should be our central focus - raising a healthy, regulated human being.

In 1950, and in the year 2000, researchers studied regulation in three, five, and seven-year-olds, by looking at one simple self-regulating task, which was their ability to stand still. Standing still is a very difficult regulating task and the ability to do so tells us a great deal about the child.

The test results tell us a lot about what is happening to children in our culture. In the year 2000, the three-year-old children were unable to do at all what the three-year-olds did in 1950. The five-year-olds in 2000 were barely matching the standard set by three-year-olds in 1950, and the seven-year-olds of 2000 struggled to keep up with the five-year-old standard of 1950.

Over 50 years, this basic standard for self-regulation disintegrated markedly.

How does this answer our questions about trauma?

The child who cannot process their sensory world because of the early and deep contact with a loving adult, creates a system that is more cortisol-based than is optimal, lives in a world of stress, and, if coupled with specific early life trauma, can exacerbate the hyper arousal and dysregulation that presents in the classroom as ADHD or other diagnostic labels.

And while we might find behavioral approaches to calm the external presentation of these behaviors, it is only be replicating the Developmental Sequence in the context of appropriate parenting that we can reclaim a level of calm in our traumatized and SPD children.

The resolution of this problem looks like:

The child becomes flexible and calm in a wider range of environments, from theaters to family gatherings, in busy classrooms, and at the mall. They can filter out what they don't need to attend to and attend to what is important.

Tactile

Normal tactile development:

At this stage of development, life preservation is a primary concern for the brain. The baby is keenly alert to, and will inform you of, their exposure to extremes of heat, cold, pain, and hunger. Their loud cry expresses "Help, come get me! I am going to die". And even though the infant cannot drown in their wet diaper, their cry indicates an urgency to get away from the threat. They are having experiences that are black and white; life or death. This infant is saving its own life in effect, and that is the job of the pons level brain.

When the system is injured or impaired there are troubling consequences for behavior, and these have ramifications for processing trauma.

Disrupted development:

If, due to injury, toxic exposure, or other disruptions of function, the child does not have a keen sense of pain, they may not feel it immediately and appropriately. The behavior that follows is common among survivors of trauma.

This may be the child who takes risks but is also fearful, not knowing where 'safety' occurs. They may break a bone and go on playing soccer, but are fearful of entering a dark room.

When the brain cannot feel heat, cold, and hunger, this child may not see the necessity of normal self-care routines such as eating, or keeping cool or warm, as the case may be. However, they may also interpret this as the parent or caregiver abandoning their needs. They may feel unloved, unwanted, anxious, and angry. They cannot feel safe because the world gives them no feedback about when they are safe and when their safety is at risk. In fact, this is the brain that cannot adequately perceive heat, cold, pain, or hunger.

This is the child or teen who can starve themselves, and in our work with anorexics, we have never experienced an individual with anorexia who does not also have a pons level disruption.

It is also the child who may cut themselves to finally have a sense of relief, to finally feel SOMETHING. Additionally, they may take the hottest of hot showers, or go out in the snow without appropriate clothing.

Additionally, our pons level traumatized children may not be aware of the strong feelings of others, thus appear to lack compassion. The child who does not understand what causes pain in themselves certainly cannot understand that pain exists for others. They may be physically abusive, resort to physical violence when angry, and express no remorse because the world of strong feelings is unavailable and makes no sense to them. This traumatized child can then become the bully and spread trauma further to other children or care givers.

An extension of this is the ability or inability to feel strong, positive emotions. Thus, we see a blunting of joy, deep love and compassion. Many children who go through a program of NeuroDevelopmental Movement become more responsible in their interactions with others as they become aware of inflicting pain. But they also frequently become more loving and joyous.

Resolution of this problem looks like:

The child feels 'I belong. I can survive. I have a place in the universe. I know others belong and have their needs'.

Gross Motor/Mobility

Normal gross motor/mobility development:

Crawling is initially a way to retreat from a perceived danger. As it aligns the body, it gives the body the information that we support, ground, and thrust through our lower body, leaving our upper body free to carve, shape, embrace, and relate to the universe. Hip sockets stabilize during the crawling phase and lordotic curves - the lumbar and cervical curves - stabilize.

The sense of opening the vital and soft front aspect of the body first towards the mother's body and then towards the floor, supports a sense of safe upright openness in our posture.

As well, crawling is an activity critical to the integration of other functions at this level of the central nervous system, supporting smooth horizontal tracking, the stabilization of the hips, and, in the presence of an appropriate sensory program, it helps the brain more appropriately feel vital sensations of heat, cold, pain, and hunger.

Receptors in the bottoms of the feet feed the brain information about physical stability when we are crawling on the belly with a full toe thrust forward. We develop a greater sense of security that lasts through the lifespan.

Disrupted development:

The child may not feel they can 'stand up for themselves' and may be more anxious, fearful, be described as having 'anxious attachment', can't stand their ground.

They often have slumped posture, even hip dysplasia, feet that turn out, and rounded shoulders.

Resolution of this problem looks like: A child who feels they can confidently stand up for themselves, with good upright posture and a confident stride in walking.

Language

Normal language development:

This baby exhibits a vital, loud cry in response to life threatening events and sensations. In a safe and appropriate family, this child will cry, the parent will come to meet the need, the need is met, and the child is part of a call/response cycle that gives them the sense that they are cared for.

Disrupted development:

This may be the 'good baby' who 'never cries'. This is the silent child, and as well, a child who does not trust that anyone will care for them. This may look like never speaking out on their own behalf when older, an inability to state one's own case.

Resolution of this problem looks like:

The child who cannot be manipulated by peers or adults, is able to say no, and is able to reasonably speak up for themselves.

Manual

Normal manual development:

The tight grasp reflex of the neonate begins to release by this phase of development. You can put your finger in the baby's palm and they will close their fingers around it, but with much pressure the hand will open and the fingers will release.

Disrupted development:

In the late 1980s, when the Ceausescu regime fell in Romania, the doors were opened to the horrific orphanages that housed thousands of unwanted children. The world rushed in to take these children back to the United States, to England, to Ireland, and other countries around the world.

As Florence Scott and I watched these events, she said, 'Those children are going to ruin those families'. In my own naïveté and still a student of brain development, I did not understand why. I thought that the love, care, and comfort the new families would bring would certainly heal the pain.

But at that time, Americans were adopting primarily from within the States. Few children were adopted from Eastern Europe, due to a number of socio-economic factors. The diagnosis and the term Reactive Attachment Disorder were only recognized by the DSM in the 1980s and Florence Scott herself was trying to understand this condition that did not yet have a name, and to create protocols for healing these children.

The one feature that she noticed was that all of the children who had been through these severe levels of trauma, often in institutional settings, did not release the neonatal grasp reflex. It was not that they could not do it, but rather that the security derived from keeping the thumbs tightly tucked in the fists was critical to doing any challenging task, including being close to other people.

For a time, we diagnosed RAD from the fisted hand. Now we know that the diagnostic process in the NeuroDevelopmental Movement evaluation is more complex, but it helped us begin to understand the neurodevelopmental features of this new and challenging disorder.

Pons level disruption summary:

Children who have had early life exposure to violence, abuse, neglect; children who have had head injuries, birth trauma, or strokes, may exhibit a series of social, emotional, and physical characteristics that are quite specific to this level of injury.

They may have any, some, or a few of the following issues:

- Unable to make comfortable eye contact
- Reading is compromised by missing the little words, substitution of words, or simply a lack of interest in reading
- Poor posture, with slumping shoulders and head, shallow curve in the lumbar area, even back pain
- Awkward
- Hypervigilant, ready to fight, flee, or freeze, even when a stimulus is not great enough to evoke these responses
- Black and white thinking. It is "all about them all the time". What does not serve them is perceived as unfair or mean
- High tolerance for pain; can inflict pain on self and others without understanding the consequences
- Lack of remorse
- Bullying behaviors
- Anorexia or poor appetite, extremely limited diet
- Risk taker

- Anxious
- Lacks compassion
- Can't see the other's point of view
- Feels like no one loves them; says they have no friends, even with evidence that they are liked by peers
- Suicidal or says to parents "kill me, now"
- Hits, scratches, kicks, bites parents or authority figures
- Frequently has problems in school due to fighting and hurting others

Resolution of pons level neurodevelopmental challenges looks like:

The child knows they belong, that they are loved, that they have a place in their family and in their school. This child is able to develop compassion, understand the needs of others and can work in groups. They no longer pose a danger to themselves and their community and become much easier to work with at home and school. Reading can improve in fluency. You might see more upright posture, more pride in themselves.

We have discussed the pons level brain, a pre-cortical level of brain development that usually happens between two and a half and seven months of age. However, at all stages during the life span, this brain and what it tells us about the world continues to underlie the decisions we make, the way we learn, the interactions we have with family, friends, and community.

At any stage during the lifespan, a traumatized or brain injured child or adult can, based on a clear and thorough Neurodevelopmental Evaluation, replicate or repeat the developmental activities that activate and organize this brain stage. At any time in life we can heal from the trauma that is both stored in this brain and continues to trigger us.

As we continue with the next paper in this subject, we will explore how mid-cerebrum, or midbrain levels of functioning can be impaired by trauma and the consequences for behavior, social skills, learning, and well-being. We will also explore the resolution of these problems.

Subsequently, we will discuss prenatal trauma, and the very specific behaviors we see as a result of these deep wounds. And even in wounds as profound as prenatal violence, we will explore specific resolution to the challenges of a brain that is damaged before birth.

The Developmental Sequence is, for many children, the key to understanding, accessing, and healing pre-verbal trauma. It can open, bring light to and heal the 'Big Black Bag of Ickiness" that is developmental trauma.

NeuroDevelopmental Movement is the discipline that evaluates sensory and motor skills at all levels of central nervous system functioning, and can provide programs to normalize neurology as part of the pathway back to a healthy brain and a healthy life.

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