Building Brains by Making Connections

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Objectives

• Explore the correspondence between evidence-based parent-child attachment activities and what is taking place inside a child’s brain.

• Review new brain research that supports the role of experience as well as genetics in the building of healthy brains.

• Reflect on what aspects of brain research we might bring to our work with children and families.
## Brain Growth

<table>
<thead>
<tr>
<th>Age</th>
<th>Brain Weight (g)</th>
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<tbody>
<tr>
<td>20 weeks gestation</td>
<td>100</td>
</tr>
<tr>
<td>Birth</td>
<td>400</td>
</tr>
<tr>
<td>18 months</td>
<td>800</td>
</tr>
<tr>
<td>3 years</td>
<td>1100</td>
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<tr>
<td>Adult</td>
<td>1300-1400</td>
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In some stage of development, the brain is adding 250,000 – 500,000 new neurons (brain cells) per minute.
The Neuron

New neuron connections
~1000 trillion connections by age 3 yrs.
Brain Development – Synapse Formation

Birth | 1 month | 6 months | 24 months
How Does the Developing Brain Become Aware, Learn, Think,?

- Overproduction of neurons and neuronal connections
- Selective reduction of neurons and connections
- Periods of intense branching and connecting followed by reduction in neurons
Experience-Based Brain Plasticity

• Genes and environment interact throughout brain development
  – Genes form neurons, connections among major brain regions
  – Environment and experience refines the connections; enhancing some connections while eliminating others

• Brain development is activity/experience-dependent

• Neural circuits used over and over strengthen, those that are not used are dropped resulting in “synaptic pruning”
Neglect and Brain Development

• Limited exposure to language, touch or social interactions
• Emotional or cognitive neglect
• Early life stress

Structural Changes in the Brain
  – Lack of brain growth beyond effects of poor nutrition
  – Neuronal death beyond “pruning”
Persistent Adversity Changes Brain Architecture

Normal

Prefrontal Cortex and Hippocampus

Typical - neuron with many connections

Chronic stress

Neuron damaged by toxic stress – fewer connections

Persistent Adversity Changes Brain Architecture

Brain scans from the Child Trauma Academy - Dr. Bruce Perry
Major Areas of the Brain

- Self-regulation, problem solving, goal setting, social cognition
- Hearing, language, memory, social-emotional function
- Sensory motor perception, Spatial abilities
- Vision and perception
How Brain Areas are Developing

Anatomical studies of brain development show

- Occipital lobes show earliest pruning
- Frontal and Temporal lobes show growth of neural connections and pruning longer than other areas of
  * Greatest change between 2 years and 5 years
  * Frontal lobes continue until adolescence
How Brain Function is Developing

• Brain areas with longest periods of organization:
  – self-regulation
  – problem-solving
  – language/communication
  – social bonding

• Most dynamic growth, pruning, connecting, and activity occurs between 1-1/2 years through 3 or 4 years old

• Research in neuroscience suggests that this may be one of the most important periods for developing self-regulation, problem-solving, social-emotional, and language/communication behaviors
What early experiences promote healthy brain development?

• Important areas of brain development are associated with…
  – Self-control or Self-regulation
  – Language/communication
  – Learning
  – Social emotional function

• Research shows that everyday experiences with caregivers or other children can optimize the development in these areas
Key Process Element

- Early experiences create brain neuron connections
- Parent-child interactions are key
Healthy brain development requires consistent and nurturing relationships

These relationships shape emotional growth, self-regulations and social competence

Positive early relationships buffer stress

“Healthy brain connections depend on healthy human connections”
Impact of Attachment

Your attachment style affects how you live your life in many ways
ATTACHMENT STYLES

Secure Attachment — You feel secure in relationships. You can function on your own but like to lean in for support when under stress. You preserve relationships by seeking connection and negotiating the needs of you and your partner.

Avoidant Attachment — You feel safer being independent. You have learned to manage your distress on your own. You try not to be a bother or make emotional demands on your loved ones. You try to preserve relationships by keeping emotional needs to yourself.

Ambivalent Attachment — You feel safer being dependent. You have learned to manage your distress by protesting and making a fuss. You try to preserve relationships by provoking fights and then making up.

Disorganized Attachment — You feel anxious and insecure in relationships. This may be due to past abuse, neglect or trauma. When you feel threatened or misunderstood, you have inconsistent ways of protecting yourself. You may shut off your feelings. Or you may seek comfort then reject it.
In the last 10 years attachment theory has become the most complex theory of the development of the brain/mind/body available to science.

*Allan Schore, 2011*
A Framework for ‘Building Brains’

1. Create a loving connection
2. Be a secure base
3. Accept feelings
4. Set limits with love
5. Have “baby conversations”
Create a Loving Connection

Child

Child needs a ‘secure attachment’
an emotional bond between parent and child in which the child is unconditionally loved and protected.
Happens when primary caregiver responds calmly, warmly and consistently

Parent’s can:

Talk affectionately to their child.
Touch child in a gentle way
Give their child undivided attention
Laugh and play together
Respond with sensitivity and comfort especially when their child is sick, hurt or upset
Debbie Jeffrey (2008)  A paper presented to the Australian Adoption Conference, Sydney, Australia
Disrupted Attachment

Child Distressed
- Increased heart rate, breathing
- Feels enraged, helpless, hopeless

Child Learns
- Caregivers are untrustworthy
- The world is a hard place
- No-one can meet my needs
- My needs don't make sense

No Comfort
Caregiver doesn't come, or doesn't acknowledge or attend to child's need

Child Distressed
- Increased heart rate, breathing
- Enraged, helpless, hopeless
Be a Secure Base

Child
This helps them….
Feel secure inside themselves
Seek comfort when needed
Handle the ups and downs of life
Feel curious and confident to explore the world,

Parent’s can
Respond consistently to their child’s request for attention, comfort and exploration
Watch over their child while they explore
Welcome their child back when she wants to be close
Provide predictable daily routines and special family rituals.
Accept Feelings

**Child**

Needs their feelings accepted in order to:

- Develop a positive sense of themselves
- Express how they feel rather than act out in inappropriate ways

**Parent’s can:**

- Mirror the child’s emotional rhythm and intensity
- Treat all feelings seriously - happy, sad, excited, angry etc.
- Respond sensitively and promptly
- Give their child the words for how they are feeling.
Left Mind – Right Mind

language production

language comprehension

non-linguistic components of language

emotional communication

emotional comprehension

prosody

facial expressions
Human Brain Development
right brain dominates for first three years

Nonverbal emotional communication

Verbal language

Prenatal  0  1  2  3  4  5

Ruth P. Newton 2008
“One of the most powerful coping tools you can give your child is giving her permission to express her negative feelings”

*Stanley Greenspan*
Setting Limits with Love

Child

Develop self-control – also known as self-regulation
Avoid hurting themselves or others
Learn what is expected within their family and community

Parents can:

Establish routines in the home when their baby is young
Approach limit-setting as an opportunity to ‘teach’ not punishment
Find ways to say yes more often than no
Say no in a calm respectful way
Setting Limits with Love promotes ‘upstairs-downstairs’ brain integration

planning
attention
inhibition
fear
emotion

Adapted from Dan Siegel (2011)
The Whole Brain Child
Have ‘Baby Conversations’

Child
Connect with people around them
Express their needs, interests and feelings
Control their behavior and emotions
Learn about their world

Parents can
Talk in response to their child’s interests and feelings
Use an expressive voice and gestures
Name things their child shows interest in
Expand on their child’s words and ideas
Effects of Mother’s Speech on Infant Vocabulary
Parenting and Word Acquisition

Proportion Reaching 50 Words

Age (months)

Low Responsiveness
High Responsiveness
Differences in brain activity between a typical child reader and a child with reading difficulties
Differences in brain activity in the same child before and after specialized reading instruction
Conclusion

• We now know more about the early developmental period and its affect on child outcome

• Research in brain development supports the notion that a health early parent-child relationship support better brain development

“Healthy brain connection depend on healthy human connections”

• With the development of new functional neural techniques allowing us to see the infant brain in action will help better inform us on the structural and functional changes in a child’s brain during these parenting interventions
Thank-you

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