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CONNECTING THEORIES TO PRACTICE: NEUROSEQUENTIAL DEVELOPMENT, CHILD DEVELOPMENT AND PLAY ACTIVITIES

A PSYCHOEDUCATIONAL BOOKLET FOR EARLY CHILDHOOD TEACHERS AND EDUCATORS (0-5 YEARS)

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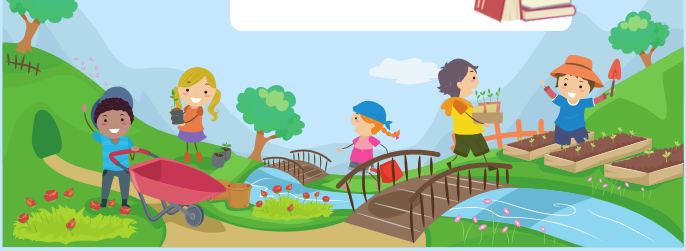


PART I: The Neurosequential development

1. BRAIN

AS EARLY CHILDHOOD TEACHERS AND EDUCATORS, WE ALL THOROUGHLY UNDERSTAND CHILD DEVELOPMENT AS A SERIES OF BEHAVIOUR CHANGES IN BIOLOGICAL, SOCIAL AND ENVIRONMENTAL LEVELS ACROSS AGES (SLEE ET AL., 2012). IF WE THINK UNDERSTANDING THE CONCEPT OF CHILD DEVELOPMENT HELPS US UNDERSTAND EACH CHILD'S 'LOCATION OF SUBURBS', TO GAIN BASIC KNOWLEDGE OF HOW THE BRAIN WORKS WOULD ALLOW US TO KNOW THE CHILD'S 'STREET NAME AND HOUSE NUMBER'.

Humans are born with approximately 100 billion neurons (brain cells). Some neuron connections are made in the womb, and sensations and experiences after birth form more new brain connections (Asquith, 2020; Darling-Kuria, 2010). If we think human brain as a house, the part that has made complete connections in the uterus and early childhood would be the foundation, and the 'brain house' builds from the bottom up, over time, until the mid-20s (Asquith, 2020).

1.1 THE TRIUNE BRAIN

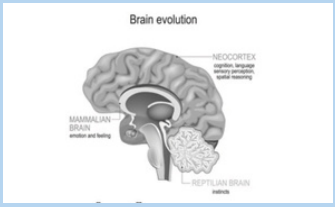


FIGURE 1: ASQUITH (2020, FIGURE 2.1, P.32) THE MODERN TRIUNE BRAIN

HUMAN BRAIN (NEOCORTEX)

MAMMALIAN BRAIN (LIMBC SYSTEM)

REPTILIAN BRAIN (BRAIN STEM & CEREBELLUM)

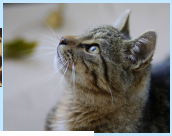
REPTILIAN BRAIN

The Reptilian brain fully develops before birth in full-term babies (active growth: 0-2 years old). (Badenoch, 2008)
The Key Word: Premature

It consists brain stem and cerebellum. The **brain stem** controls the automated body functions (breathing, sleeping, blood pressure, heart rate). **Cerebellum** coordinates body movement and contributes to emotional and cognitive functions (Badenoch, 2008; Prendiville, 2016; Graham, 2016)

The reptilian brain has great reliability, but it is a lack of flexibility to change and modify (Graham, 2016)

MAMMALIAN BRAIN



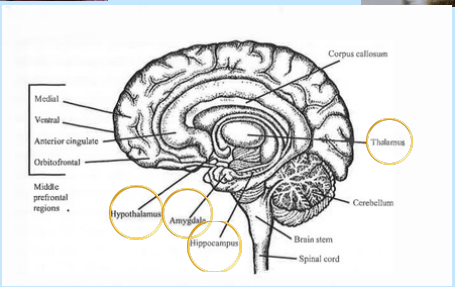


FIGURE 2: BADENOCH, B (2008, FIGURE 2.2, P. 15) RIGHT-HEMISPHERE LIMIC AND MIDDLE PREFRONTAL REGIONS

- Mammalian Brain (or limbic system) is our 'animal brain' (active growth; 1-4 years old). It is located on the brain stem and connects to our emotions and behaviours. It controls our animal instincts such as fight and flight instinct, feeding instinct and reproduction instinct.
- This part of the brain includes **Thalamus**, **Hypothalamus**, **Hippocampus** and **Amygdala** and interacts with the frontal lobes (part of the neocortex).

(Darling-Kuria, 2010; Asquith, 2020; Prendiville, 2016; Graham, 2016; Beijian, 2020)

THALAMUS

Thalamus is in charge of directing all the sensory input (except smell) to different parts of the brain. It receives information from four senses (touch, vision, hearing and taste) and sends it to the neocortex (Darling-Kuria, 2010).

The Key Word: Sensory input

HYPOTHALAMUS

Hypothalamus has a connection to the central nervous system (a part of our nervous system) as it controls releasing hormones essential to all our body functions. (Darling-Kuria, 2010; Badenoch, 2008; Prendiville, 2016)

The Key Word: Brain-Body

HIPPOCAMPUS

H Hippocampus determines to send meaningful new information to working memory, and the important ones will go to long-term memory. Because the process involves examining the information stored in working memory, the hippocampus also has a part in recovering data embedded in the past (Badenoch, 2008; Darling-Kuria, 2010).

The Key Word: Remebering

AMYGDALA

Amygdala is the human's first alert system. When it senses danger or threat, it quickly rings the bell to alert other brain parts and prepare to react to it (Darling-Kuria, 2010; Siegel & Bryson, 2019; Fraser, 2014; Asquith 2020).

If we think in an early childhood setting, when we conduct an 'intruder' evacuation, we must gather children in a safe place inside and lock down the whole centre. Amygdala is like the watchdog; if it barks, we know the intruder is approaching, and we cannot continue our everyday practice as usual. Instead, we must stay alert and ready to protect ourselves and the children, either fight or run away. Therefore, when Amygdala activates, it can completely control our thinking brain.

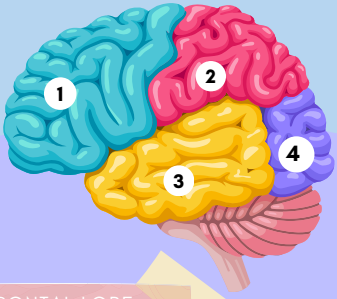
The Key Word: Stress responses

Amygdala operates with the autonomic nervous system (ANS). It consists of the sympathetic and parasympathetic nervous systems. When the sympathetic system is in charge, we might experience a **fight-flight** response; when the parasympathetic system takes over, we may experience **freeze**. Freeze with danger: withdrawal. Freeze without danger: Calmness. (Prendiville, 2016)

Human Brain

The human brain, or neocortex, is the most recent but highly developed part of the brain (active growth: 3-6 years old). It oversees high-order thinking, sensory perception, language, cognition, and reasoning (Badenonch, 2008; Darling-Kuria, 2010; Asquith, 2020; Prendiville, 2016; Graham, 2016; Beijian, 2020).

The Neocortex consists of four lobes in charge of different functions. The lobes connect to the cerebellum and interact with the limbic system (Badenonch, 2008; Darling-Kuria, 2010; Asquith, 2020; Prendiville, 2016; Graham, 2016; Beijian, 2020).



1. FRONTAL LOBE

- It sends new information to the hippocampus, if hippocampus decides the information can be stored as long-term memory, it returns to frontal lobe.
- **The prefrontal cortex** is where **executive functions** are situated.
- Because of the new information exchange and integration process, the understanding and practice of **scaffolding** are vital for children's learning.

(Graham, 2016; Darling-Kuria, 2010; Asquith, 2020)

2. PARIETAL LOBE

- It processes information generated through touch, pain, temperature and pressure
- It also helps us understand languages.

(Badenoch, 2008; Darling-Kuria, 2010)

3. TEMPORAL LOBE

- It processes smell and hearing information
- It has some integative functions related to memory

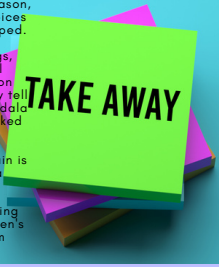
(Badenoch, 2008; Darling-Kuria, 2010)

4. OCCIPITAL LOBE

- It is responsible for vision
- It combines pieces of visual information with other sensory experiences into a whole image.

(Badenoch, 2008; Darling-Kuria, 2010)

- Our brain develops and works from the **bottom upwards**. Young children find it difficult to reason, consider consequences, or make expected choices because their neocortex is not yet fully developed.
- When children have a meltdown or present challenging behaviours (kicking, throwing things, hitting, running away or hiding), they don't feel safe physically and emotionally. Trying to reason with them, talk about consequences or verbally tell them to calm down will not work as their amygdala triggered a fight-flight response and has hijacked their thinking brain, so they cannot respond rationally (**Use-dependent**).
- Children can only learn when their thinking brain is engaged, which means they can only learn in a **safe and positive environment**.
- Early childhood teachers and educators must consistently provide new and meaningful learning experiences in various ways to stimulate children's brain activities and create a positive long-term memory.

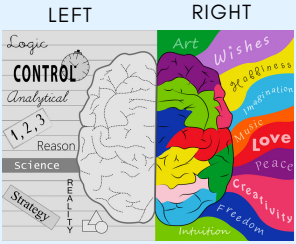


(Darling-Kuria, 2010; Badenoch, 2008; Gaskill & Perry, 2014; Hong & Mason, 2016; Siegel & Bryson, 2019)

1.2 CEREBRAL HEMISPHERES

- The brain is divided into two hemispheres: left and right. They connect and communicate through nerve fibres (corpus callosum).
- The **right brain** is dominant in **the early years of life**; it is involved with limbic systems, sensory-based and associated with emotions, attachment and bonding, and empathy.
- It makes sense that early childhood teachers and educators focus on building relationships with the children by smiling, greeting, going down to their level, making eye contact and using art and craft activities and music and movement to engage them. There are all '**right hemisphere activities**'!

(Darling-Kuria, 2010; Prendiville, 2016; Hong & Mason, 2016; Graham, 2016)



2. MEMORY

Understanding how memory works helps early childhood teachers and educators understand how and why children process and interact with their environment (Hong & Mason, 2016).
The memory we usually talk about is long-term memory, including explicit memory and implicit memory.

EXPLICIT MEMORY	IMPLICIT MEMORY
Is activated from the age of 3	Forms **prenatally** and is the only type of memory available during infancy.
Is processed through the **hippocampus** and associated with the **left hemisphere**.	Is based in the **right hemisphere** and associated with **amygdala**.
Connects to specific name, place and time and develops via interpersonal interactions.	Links to emotions, events, experiences and sensations sensorially and somatically.

(Darling-Kuria, 2010; Hong & Mason, 2016;Prendiville, 2016; Wheeler &Taylor, 2016; Beijan, 2020)

Summary

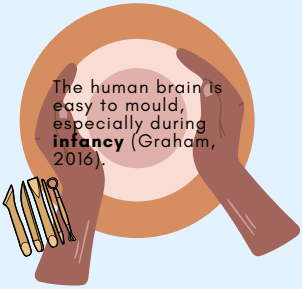
Adverse childhood experiences, traumatic events, chaotic environment, negative experiences	Safe environment, secure attachment, positive experiences
↓	↓
Have painful and difficult memory, the amygdala always stays alert, and have trouble building trusting relationships	Have positive memory, a calm emotional state, and a positive self-image, and have trust in themselves, others and the world
↓	↓
Be unable to learn as the higher brain is not accessible	Be able to learn new information and access higher functions of the brain

THE KEY WORD: EXPERIENCE EXPECTANT AND DEPENDENT

3. NEUROPLASTICITY

Our muscles have 'muscle memory' but also adapt to new exercises and training and create new memories. Our brain is like a muscle group. The ability to adapt to new experiences is called neuroplasticity.

The Key Word: Plastic & Malleable



The human brain is easy to mould, especially during **infancy** (Graham, 2016).

Through **new, consistent and repetitive experiences**, children can develop alternative neural connections to create new understanding, feelings and behaviours relating to their past experiences and memories (Wheeler & Taylor, 2016).

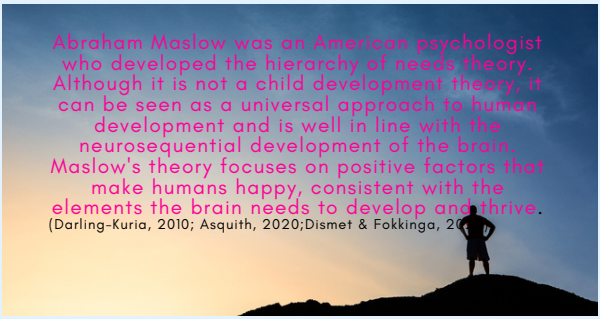
'Healthy attachment experiences activate the connections between groups of neurons, strengthening neural pathways and connections'.
(Siegel, 2012, as cited in Beijan, 2020, p.66)

CONCLUSTION OF PART I

1. The brain is born **premature** and develops and organises **hierarchically and sequentially.**
2. When young children's amygdala is triggered, their neocortex is not activated. Therefore, it cannot be changed. Instead, we need to target the area in use (e.g., the lower part of the brain) and provide support accordingly (or **'Use-dependent'**).
3. Experiences and the environment can shape and modify the brain (**'Plastic' and experience-expectant dependent**). The infant and young children's brains are the easiest to manipulate (**Early years** are crucial for brain development).

(Perry, 2014; Prendiville & Howard, 2016)

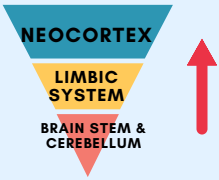
PART II: MASLOW'S HIERARCHY OF NEEDS AND THE NEUROSEQUENTIAL DEVELOPMENT OF THE BRAIN



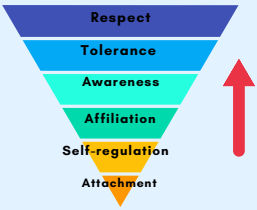
MASLOW'S HIERARCHY OF NEEDS

FIGURE 3: DESMET AND FOKKINGA (2020, FIGURE 1, P.22) PYRAMID REPRESENTATION OF MASLOW'S HIERARCHY OF NEEDS

THE NEUROSEQUENTIAL DEVELOPMENT OF THE BRAIN



6 CORE STRENGTHS OF CHILD DEVELOPMENT

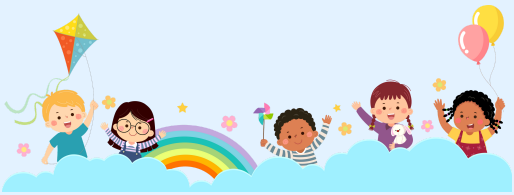


(Perry, 2009; Prasad, 2011)

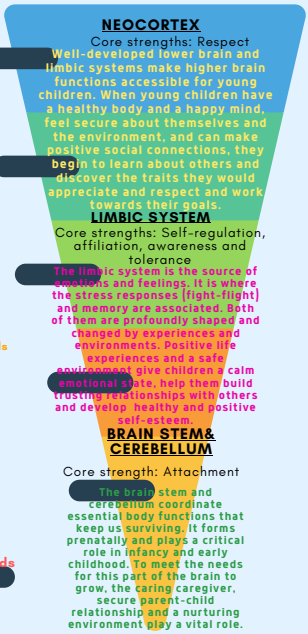
Six core strengths develop **sequentially** and build upon each other are vital for children's development. Children develop typically and reach their full potential when **all** their strengths are developed. The core strengths continue to **grow and change** throughout the lifespan (Prasad,2011, p.8).

Need Category	Description
5. Self-actualization Needs	Once all previous needs have been met, an individual can direct his or her focus toward the 'development of the self'. This category includes the highest-level needs that one could satisfy, such as the need to maximize one's potential, or the needs for personal growth, creativity, morality, and meaning making.
4. Esteem Needs	Esteem needs fall into two categories. The first contains needs for validation from others, such as the need for status, respect, recognition, and reputation. The second includes needs for positive self-evaluation, such as the need for competence, confidence in ability, accomplishment, and skills mastery.
3. Social Needs	Social needs include the need for belonging, love, intimacy, and affection. Relationships with friends, romantic partners, and families fulfil this need, as does involvement in communities and social or religious groups.
2. Security Needs	Security needs are psychological, such as the need for a safe family environment, steady employment, a safe neighbourhood, and a stable financial situation.
1. Physiological Needs	Physiological needs are the basic needs of any living organism: the requirements for the body to survive, such as the need for water, oxygen, food, and sleep. In general, physiological needs influence behaviour through direct desires or cravings.

FIGURE 4: DESMET AND FOKKINGA (2020, TABLE 1, P.25) THE FIVE NEED CATEGORIES IN MASLOW'S HIERARCHY OF NEEDS



FOR YOUNG CHILDREN, IT MEANS....



(Dismet & Fokkinga, 2020)

(Perry, 2009; Prasad, 2011; Prendville, 2016; Asquith, 2020)

PART III:

PLAY ACTIVITIES IN EARLY CHILDHOOD SETTINGS (0-5 YEARS)

3.1

To meet physiology needs and safety needs

Engagement of brain stem and cerebellum

Core strength: Attachment

Key focus:
- Secure attachment
- Soothing the physiology

The brain stem and cerebellum's primary developmental goals are to develop state regulation, early attachment, sensory integration, motor control and relational flexibility (Prendiville & Howard, 2016). In addition, patterned, repetitive and rhythmic sensory information can be sorted into long-term implicit memory, creating new learning experiences for children (Perry & Gaskill, 2013; Prendiville & Fearn, 2016).

Attachment play involving music and rhymes and gentle movement and touch(McGrath, 2016), for example:
five little piggies,
row row row your boat
round and round a garden

Consonant movement (educators and children are engaged in the same activity): yoga or dancing together, rolling balls or affectionate rough-and-tumble play (Fearn & Troccoli, 2016, p. 108).

Sensory play: play dough, slime, clay, loose parts, finger or hand painting (Prendiville & Fearn, 2016, pp.125-126).

3.2

To meet social needs and esteem needs

Engagement of the limbic system

Core strengths: Self-regulation, affiliation, self-awareness and tolerance

- Key focus: Facilitate and enhance emotion regulation
- Self-expression

The limbic system's primary developmental goals are emotional regulation, relation, and empathy (Prendville & Howard, 2016, p.24). Play activities allow children to externalise internal feelings and thoughts with a non-verbal option, helping them feel understood and accepted. In addition, it focuses on right brain activities. It encourages the integration of implicit and explicit memory so children can recall and re-enact their previous experiences, thereby promoting brain neuroplasticity (Donnelly, 2016).

Art and craft activities create symbols or metaphors for self-expression: painting, drawing, mark-making, or creating with plastic art materials (pastels, clay) (Donnelly, 2016).

Musk or puppets projective and relational play: helping children identify and articulate emotions while providing a safe distance from their emotional experiences (Malchiodi, 2020).

Kinetic sand and miniature play: providing sensory and kinesthetic experiences for bottom-up brain integration, creating a safe place for children to express their complex feelings, and facilitating children with poor verbal communication skills (Sweeney, 2016).

Stop-go games include 'floor is lava', 'freeze game', and 'musical chair', encourage focused attention and self-control, and help children learn to 'slow down' (Powell, 2018, p. 112)

3.3

To meet self-actualisation needs

Engagement of the neocortex

Core strength: Respect

Key focus:
- Imagination and creativity
- Executive functions
- Social skills

The neocortex's primary developmental goals are creativity, abstract reasoning, respect and moral and spiritual foundations (Prendiville & Howard, 2016, p. 25). Play activities allow the right and left hemisphere integration and the bottom-up brain integration, supporting high thinking functions such as problem-solving skills, reflecting and reasoning, which impact on children's social competence and future school performance (De Faoite et al., 2016, Stagnitti, 2016).

Pretend play activates both limbic and neocortex systems. A home corner and dress-up area support older children to create collective meaning in social play and help younger children to revisit and reflect on their daily life experiences. It allows children to process logical thinking, understand other perspectives and learn to negotiate (Stagnitti, 2016).

Storytelling using pictures, props and enactment: for the storyteller to organise their thinking, reenact and reflect on their previous experiences; for the listener to pay attention, listen actively and show respect (Powell, 2018).

Puzzles help children develop problem-solving, reasoning, sequencing, and logical thinking skills. It also supports lower brain parts engagement, such as fine-motor skills, eye-hand coordination and spatial awareness. (Darling-Kuria, 2010, p. 26).

Reference

Asquith, S. (2020). Brain Development. In S. Asquith, *Self-regulation skills in young children: Activities and strategies for practitioners and parents* (pp. 31-40). Jessica Kingsley publishers.

Badenoch, B. (2008). The brain's building blocks. In B. Bonnie, *Being a brain-wise therapist; a practical guide to interpersonal neurobiology* (pp. 7-22). W. W. Norton & Co.

Beijan, L. L. (2020). Incorporating Interpersonal Neurobiology in Child Parent Relationship Therapy. *International Journal of Play Therapy, 29*(2), 65-73. http://dx.doi.org/10/1037/pla0000113

Darling-Kuria, N. (2010). The brain: its Parts and Their Functions in Learning and Memory. In N. Darling-Kuria, *Brain-Based Early Learing Activities: Connecting Theory and Practice* (pp. 13-20). Redleaf.

Darling-Kuria, N. (2010). Creating Brain-Compatible Learning Environments. In N. Darling-Kuria, *Brain-Based Early Learning Activities: Connecting Theory and Practice* (pp.21-27). Redleaf.

De Faoite, A. T., Prendiville, E., & Fraser, T. (2016). Telling tales: Weaving new neural networks. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.171-184). Taylor & Francis Group.

Desmet, P., & Fokkinga, S. (2020). Beyond Maslow's Pyramid: Introducing a Typology of Thirteen Fundamental Needs for Human-Centered Design. *Multimodal Technologies and Interaction, 38*(4), 1-22. Doi:10.3390/mti4030038

Donnelly, C. C. (2016). Art in psychotherapy: The healing power of images. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.141-156). Taylor & Francis Group.

Fearn, M., & Troccoli, P. (2016). Being, becoming and healing through movement and touch. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.101-120). Taylor & Francis Group.

Fraser, T. (2014). How neuroscience can inform play therapy practice with parents and carers. In E. Prendiville, & J. Howard (Eds), *Play therapy today: Contemporary practice with individuals, groups and carers.* (pp. 179-198). Taylor & Francis Group.

Gaskill, R. L., & Perry, B. D. (2013). The neurobiological power of play: Using the neurosequential model of therapeutics to guide play in the healing process. In C. A. Malchiodi, & D. A. Crenshaw, *Creative arts and play therapy for attachment problems* (pp. 178-194). Guilford Publications.

Graham, M. (2016). Biology and the brain. In M. Graham, *Nurturing Natures: attachment and children's emotional, sociocultural and brain development* (pp. 89-105). Taylor & Francis Group.

Hong, R., & Mason, C. (2016). Becoming a Neurobiologically-Informed Play Therapist. *International Journal of Play Therapy, 25*(1), 35-44. http://dx.doi.org/10/1037/pla0000020

Malchiodi, C. A. (2020). A brain-body framework for expressive arts therapy. In C. A. Malchiodi, *Trauma and expressive arts therapy: brain, body, and imagination in the healing process* (pp. 64-98). Guilford Publications.

McGrath E. (2016). The role of music and rhythm in the development, integration and repair of the self. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.83-100). Taylor & Francis Group.

Perry, B. D. (2009). Examining Child Maltreatment Through a Neurodevelopmental lens: Clinical Applications of the Neurosequential Model of Therapeutics. *Journal of Loss and Trauma,* 14, 240-255.

Perry, B. D. (2014). The neurosequential model of therapeutics. In K. Brandt, B. D. Perry, S. Seligman, & E. Tronick (Eds), *Infant and early childhood mental health: Core concepts and clinical practice* (pp. 21-53). American Psychiatric Publishing.

Powell, B. (2018). *Fun games and physical activities to help heal children who hurt.* Jessica Kingsley Publishers.

Prasad, N. (2011, February). Using a neurodevelopmental lens when working with children who have experienced maltreatment. [Review of the literature by B. Perry]. *UnitingCare: Children, Young People and Families*, pp.8-15.

Prendiville, E. (2016). Neurobiology for psychotherapists. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp. 7-20). Taylor & Francis Group.

Prendiville, S., & Fearn, M. (2016). Coming alive: Finding joy through sensory play. In E.

Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.121-138). Taylor & Francis Group.

Prendiville, E., & Howard, J. (2016). Neurobiologically informed psychotherapy. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp. 21-37). Taylor & Francis Group.

Siegel, D. J., & Bryson, T. P. (2019). Building the staircase of the mind. In D. J. Siegel, & T. P. Bryson, *The whole-brain child: 12 revolutionary strategies to nurture your child's developing mind* (pp. 37-65). Scribe Publications.

Slee, P. T., Campbell, M., & Spears, B. (2012). Theoretical foundations of child development. In P. T. Slee, M. Campbell, & B. Spears, *Child, adolescent, and family development* (pp. 54-90). Cambridge University Press.

Stagnitti, K. (2016). A growing brain – a growing imagination. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.185-200). Taylor & Francis Group.

Sweeney, D. S. (2016). Sandtray therapy: Neurobiological approach. In E. Prendiville, & J. Howard (Eds.), *Creative psychotherapy: Applying the principles of neurobiology to play and expressive arts-based practice* (pp.157-170). Taylor & Francis Group.

Wheeler, N., & Taylor, D. D. (2016). Integrating Interpersonal Neurobiology With Play Therapy. *International Journal of Play Therapy, 25*(1), 24-34.