

1. Introduction

The assessment and treatment of children who have experienced trauma has undergone a major theoretical shift in the last five to ten years. Research in neuroscience and neurodevelopment has provided an enhanced and enriched understanding of the impact of trauma and attachment disruption on the developing brain (Perry, 1994; Perry et al 1995; Perry & Pollard 1998; Perry 2001, 2006, 2008, 2009; Porges 2011; Schore 2002, 2005; Siegel & Bryson 2012). These advances suggest that trauma experienced during pregnancy, infancy and early childhood impacts the development and organisation of key neural networks in the brain (Perry, 1994; Perry et al 1995; Perry & Pollard 1998; Perry 2001, 2006, 2008, 2009; Porges 2011; Schore 2002, 2005). The result is disrupted development and altered functioning in multiple functions of the brain, including behaviour and emotional functioning. Accordingly we have seen a corresponding shift in the way we think about and approach therapy with traumatised infants, children and adolescents.

In Victoria Australia, Berry Street has been applying the concepts of neurodevelopment and trauma into its clinical practice in the Take Two program since it began in 2004 and more specifically through implementation of NMT since 2006. Take Two is a therapeutic service for children who are clients of Child Protection in Victoria Australia. NMT is an assessment model developed by Dr Bruce D Perry of the ChildTrauma Academy in Houston, Texas. NMT is not a specific therapeutic technique or intervention, rather it is a way to organise information about a child's history and current functioning to inform and guide the therapeutic process. NMT helps to plan treatment that is developmentally sensitive and promotes self-regulation by improving brain functioning.

NMT has the following core neurodevelopmental concepts at its heart:

- Each part of the brain is responsible for mediating different functions. The brainstem at the lower part of our brain mediates functions such as heart rate, temperature regulation and blood pressure. The diencephalon mediates functions such as sleep/wake cycles, appetite/hunger and motor skills. Our limbic system can be thought of as the emotional and relational centre of the brain. Uniquely human and at the top of our brain is our cortex - the home of complex executive processes such as abstract thinking, problem solving and language skills. While each part of the brain is responsible for certain functions, they work together and can influence each other.
- The brain develops from the bottom up (brainstem to the cortex) and healthy organisation of one part is largely dependent on the lower part being organised well.
- Our brain develops as a function of our genetics and experience and organises in a use dependent way. The more we experience particular events, the stronger the neural connection made will be as a result. So if you grow up experiencing lots of stress and fear, you will grow up more sensitised to stress and fear.
- Most neural organisation happens in the first four to six years of life, however, the brain continues to develop throughout our lifespan. Early experiences are much more powerful in organising the way our neural connections are formed than later experiences.
- Different parts of the brain are more easily changed than others. For very good reasons the neural networks in the lower, less complex parts of our brain are harder to change than those in our cortex, which is much more plastic.
- The other key element to healthy brain organisation is the provision of safe, attuned, responsive, predictable and nurturing relationships. (Perry 2006)

With these concepts in mind, infants and children who experience trauma and/or neglect in consistent or chaotic ways during the period of rapid brain growth and organisation often have lasting neurodevelopmental insults as a result. Especially if they do not have access to well tailored therapeutic approaches for recovery and healing. While they will display the behavioural challenges that we so readily see, many of these children will also have difficulties in functions mediated by lower parts of the brain. This will manifest as a wide range of problems including cardiovascular, motor and sensory regulation, attention problems, and sleep difficulties. The foundations for and capacity to effectively use the cortical processes is compromised if the key neural networks originating in the lower parts of the brain are disorganised and dysregulated (Perry 2001, 2006; Siegel & Bryson, 2012). As a result we often see that these clients are unable to benefit initially, from traditional talking therapies because they are fundamentally too dysregulated to be able to attend, reflect and think clearly.

To be more neurodevelopmentally informed and respectful in trauma treatment and effective in healing, it makes sense that we need to reorganise and regulate these key neural networks from lower parts of the brain before we tackle the higher and more cognitive parts of the brain (Perry 2001, 2006; Siegel & Bryson, 2012). Thus we need to sequentially reorganise and regulate the brains of these children to prepare them to be ready to benefit optimally from traditional treatments. Principles from neuroscience and neurodevelopment suggest that activities to promote and develop sensory integration and self-regulation capacities now form the foundations of trauma treatment, in particular complex developmental trauma.

The NMT assessment process identifies strengths and weaknesses of functioning for the individual, and by inference brain functioning, and informs a therapy plan that aims to assist in developing and/or reorganising the brain in a developmentally appropriate way. In addition to its focus on brain functioning, the NMT also considers adverse experiences such as exposure to family violence and parental substance over the child's lifetime as well as opportunities the child may have had to develop and engage in healthy, supportive, nurturing relationships. The NMT report provides a profile of the child's developmental risk over time as well as their current relational health, which then informs the child's treatment plan. Treatment plans are developed to enhance emotional regulation skills by improving brain functioning using patterned repetitive movement/activities, the provision of relationally rich environments to manage the child's stress response system, and encourages psycho-education and inclusion of parents and teachers to improve the child's chances for success.

The Creswick Foundation Fellowship afforded me the opportunity to travel to the United States of America and Canada between May and June in 2014 to visit five of the seven ChildTrauma Academy Flagship sites (Berry Street Take Two is one and a seventh was announced just after I finalised my Fellowship submission) and two of the ChildTrauma Academy Fellows. This allowed me to observe and explore the application of the NMT informed interventions such as sensory and self-regulatory activities and the impact these interventions have had in addressing and supporting trauma recovery for infants, children and adolescents. The five ChildTrauma Academy Flagship sites that I visited were largely applying the NMT assessment framework in their residential and onsite day treatment centres. I was able to develop an understanding of the types of activities being used by our ChildTrauma Academy partners, their frequency and scheduling in the lives of vulnerable children, that lead to improved self regulation and enhanced relational connections.

Sumner Mental Health is a community based mental health service for infants through to the elderly and I visited with Dr Rick Gaskill ChildTrauma Academy Fellow, their child and adolescent mental health team and the therapeutic preschool they support in partnership with Futures Unlimited. The Child Services team are case managers who do both targeted case management (typical of Australia's mental health case management roles e.g. CAMHS) and therapeutic support case management, which incorporates a clinical intervention role. Sumner Mental Health support the preschool with the provision of Individual Psychosocial Rehabilitation (IPR) staff who provide one to one hourly support for the most difficult children so to scaffold challenging times in the preschool environment. The preschool services approximately 100 children, of which up to 15 were assessed and met seriously emotionally disturbed (SED) criteria for mental health therapeutic support in the form of direct therapeutic intervention service, case management and IPR at the preschool.

Sandhill Center is a privately run residential program for children ages five to 13, who are experiencing significant difficulties functioning in their current home, school or community due to difficulties in regulating their emotional states. Sandhill has capacity for up to 30 children and adolescents at any given time and their average length of stay is around 18 months.

Cal Farley's Boys Ranch is one of America's largest privately-funded child and family service providers specializing in both residential and community-based services at no cost to the families of children in their care. Cal Farley's hosts 28 residential homes each of which caters up to 12 children and young people. At capacity Cal Farley's can have up to 260 children and young people at a time with an independent schools district onsite. Again the average reported stay at Cal Farley's was approximately 18 months to two years.

Alexander Youth Network (AYN) is a non profit community based organisation receiving funding from fee for services (medicaid, insurance and such) as well as contributions from individuals, corporations, foundations and government agencies. AYN serves children ages five to 18, who are referred from hospitals, physicians, parents, schools and from state and county organisations such as department of social services and juvenile justice. AYN serve over 7000 children each year. AYN provide an array of mental health treatment for serious emotional and behavioural difficulties including: diagnostic and outpatient services, community based programs, multisystemic day therapy, therapeutic foster care and an onsite, 36 bed psychiatric residential treatment facility (PRTF). Clients at AYN's PRTF have an average stay of six months, dependent on funding sources and managed care organisations.