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**Trauma, Learning and Fetal Alcohol Spectrum Disorder**

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The development of a secure attachment relationship with caregivers is of primary importance to infant survival and development (Schoore, 2001). For example, the infant is dependent upon caregivers for basic needs such as nutrients, protection and warmth. In addition, the attachment bond is essential in shaping the infant's emotional, social and cognitive development (Streeck-Fischer & van der Kolk, 2000). This is because the infant's brain develops in relation to its experiences. Early care-giving relationships shape the infant's developing nervous system in the brain and body in several important ways. Because the brain develops in a use-dependent manner, the infant's brain becomes organized according to their experiences (Schoore, 2001). Early attachment experiences determine if the infant develops a secure, insecure or traumatized attachment relationship with its caregiver.

The early organization of developing brain circuitry sets the stage for information processing as the child matures (Streeck-Fischer & van der Kolk, 2000). Consequently, early attachment experiences have a significant impact on the child's cognitive development including school-based performance and behavior. The connection between attachment theory and learning is of considerable relevance for children with FASD. Researchers have found significantly higher levels of insecure and disorganized attachment patterns among children with FASD (Henry, Sloane & Black-Pond, 2007). In this literature review, the increased risk of attachment-related trauma and subsequent effects on brain development in children with FASD is explored.

Early attachment-related trauma has significant impacts on emotion regulation, stress management and consequently, school related behavior and performance. Many traumatized children have trouble with learning, concentration and attention, and their behaviour can be challenging and hard to manage (Baker & Jaffe, 2007). Understanding the brain basis of behaviors seen in traumatized children will bring about a shift in our perceptions of these children. Instead of seeing the child as willfully disobedient we can begin to understand the behaviors stem from early organization of brain circuitry caused by traumatizing experiences and neurological damage. The creation of a safe and supportive learning environment will foster cooperative behavior and successful school performance in these children.

### *FASD and Attachment Patterns*

Children with FASD are at increased risk for exposure to particular kinds of attachment-related trauma for a variety of reasons. The risk of disorganized attachment in infants whose mothers report daily moderate to heavy alcohol use is three times that of other infants (O'Connor et al., 1987). Studies show problem drinking in families is associated with less than optimal care-giving environments. Parents who engage in problem drinking might have distorted views of children and might displace anger or aggression on to them or simply ignore them (Magura & Laudet, 1996). Compared to children whose parents do not engage in problem drinking, children in families with problem drinking are at greater risk of being exposed to violence. For instance, Leonard and Eiden (2007) found a strong relationship between excessive alcohol consumption and intimate partner violence. This association between problem drinking and intimate partner violence is found in both the general population as well as in minority groups (Leonard & Eiden, 2007).

Traumatized children with FASD often show behavior that is particularly challenging to parents, such as hyperactivity, oppositional behaviours and lack of impulse control (Henry et al., 2007). As a result, parents of these children experience increased levels of stress, depression, as well as lower levels of social support (Leonard & Eiden, 2007). Parents of children with FASD are likely to experience more parenting problems and difficulty dealing with challenging child behavior (Leonard & Eiden, 2007). Taken together, the stress of parenting children with developmental difficulties along with marital conflict and violence is very likely to create less than optimal care-giving environments for infants and children with FASD.

An additional risk concerning attachment status for children with FASD is the experience of separation from attachment figures. More than 70% of children diagnosed with FASD are placed into foster care for at least some portion of their lives (Burd, 2006). Multiple foster placements and failed adoptions increase the likelihood of attachment-related trauma. The process of forming a reliable attachment bond with a sensitive caregiver is greatly compromised for these children.

### *Attachment Status, Stress Management and Emotion Regulation*

Early attachment relationships influence the stress response and internal working models of relationships (that is, our beliefs and expectations about relationships). In the following paragraphs we examine how these domains develop, first for infants in secure attachment relationships and then for infants who experience insecure or disorganized attachment relationships.

Development of the infant's stress response is shaped by the care-giving they receive from attachment figures. The caregiver of the securely attached infant reliably provides comfort during times of distress, effectively regulating the infant's stress response while the infant develops the biological framework to regulate its own stress response (Streeck-Fischer & van der Kolk, 2000). In this way, the caregiver acts as an external regulator for the infant's emotional state, while it acquires the capacity for self-regulation (Schore, 1994). Consequently, the securely attached infant's developing brain is protected from potentially harmful stress hormones during rapid brain development (Schore, 2001). The ability of the caregiver to routinely calm the infant during times of distress has substantial implications for the infant's later ability to self-soothe in response

to stress. As a result, the attachment relationship plays a unique role in shaping the child's capacity to manage emotional responses and stress reactions as the child matures.

In contrast, infants who are exposed to inconsistent, neglectful or traumatizing caregivers experience excessive stress levels which they are unable to manage effectively (Schorer, 2001). The caregiver does not act to calm the infant, and the infant is unable to calm itself and therefore, the infant remains in a state of extreme distress for extended periods of time (Schorer, 2001). When this happens, the infant expends its energy attempting to manage its body's physiological stress response, and ultimately misses out on important cognitive, social and emotional developmental opportunities (Schorer, 2001).

Development of the infant's internal working model is also shaped by the care-giving they receive from attachment figures. The early care-giving relationship helps the child create an internal working model of the attachment relationship (Schorer, 2001). This internal model begins very early with the infant's experience of comfort from the caregiver during times of distress. Through repeated interactions with caring adults, the infant develops the expectation that things will be set right again when it experiences stress (Schorer, 2001). In this way, the infant learns that stress and negative emotions can be tolerated and are followed by repair (Schorer, 2003). This internal working model serves as a foundation from which the child develops future strategies for coping and management of emotions (Schorer, 2001).

As the child matures, this inner model becomes more complex, and is constructed from both emotional and cognitive information (Streeck-Fischer & van der Kolk, 2000). For example, securely attached children learn to rely on both their emotions and cognitions to interpret and react to situations (Streeck-Fischer & van der Kolk, 2000). They have learned to integrate emotions and thinking. The brain basis for successful integration of thoughts and emotions results from the development of connections (pathways) between higher cortical structures (responsible for cognition) and the limbic brain (responsible for emotions and stress response). This way the brain is able to manage the intensity and duration of emotional reactions, allowing for a more flexible response to environmental cues (Creeden, 2004). This ability is advantageous because it allows for flexibility in perception and reaction to novel situations (Streeck-Fischer & van der Kolk, 2000). Furthermore, secure children experience the ability to make good things happen, as they have developed the expectation that caregivers will help them find appropriate solutions to problems (Streeck-Fischer & van der Kolk, 2000).

In comparison, continuously traumatized children who have violent or neglectful caregivers are likely to experience extreme levels of distress, without expectation of relief from the environment (Streeck-Fischer & van der Kolk, 2000). As a result, these children develop survival-based behaviors and learn to ignore either what they feel (emotion) or what they perceive (cognition). These two types of adaptive behaviors are a result of the organization of brain structures which developed in response to the infant's early environment. The first type is seen in children who rely on logic to interpret emotional information. These children have over-developed cortical pathways that over-regulate emotional information (Creeden, 2004). This type of information processing leads to rigid cognitive interpretation of emotions (Creeden, 2004). This pattern is disadvantageous because cognitive interpretations of emotions are less flexible and less responsive to context (Creeden, 2004). An example of this type of behavior is a child who has limited capacity to recognize emotions in other people (Creeden, 2004). One

consequence of this lack of emotional sensitivity is a decreased ability to recognize the impact of their own behavior on other people (Creeden, 2004). A child showing this type of information processing might blame others for problems they themselves caused, such as starting a fight with a peer.

The second type of adaptive response to early environments that are violent, neglectful or traumatizing is seen in children who have under-developed cortical pathways which under-regulate emotional information (Creeden, 2004). These children are unable to control emotional reactions and stress responses because their early caregiving environment did not offer opportunities for the development of emotional control and stress regulation (Schore, 2001, 2003). As a result, the child has limited capacity to control the intensity and duration of emotions such as fear, anger or despair (Schore, 2003). After being upset or having their feelings hurt, such children take a long time to calm down, and they might react strongly to events that others view as minor setbacks. This lack of control over emotions and stress response occurs in both traumatized children and children with FASD (Henry et al., 2007).

In addition, the traumatized child may be hyper-vigilant to potentially threatening environmental cues. This behavior is the result of the developmental organization of the lower brain and midbrain, and that organization occurs because the child has experienced persistent fear and anxiety in the early years of life (Creeden, 2004). Although hyper-vigilance is a brain-based survival-oriented response that is adaptive in a potentially dangerous or stressful environment, it becomes maladaptive when the environment changes, such as when the child is attending school. For traumatized children, sensory input that is not appraised as threat related is viewed as unimportant and therefore ignored (Creeden, 2004). Such children may have trouble focusing on their school work because it is not threat-related. As stated above, traumatized children are often unable to regulate their emotional and stress responses (Creeden, 2004). As a result, they may exhibit aggressive, oppositional, hyperactive, and impulsive behavior (Henry et al., 2007). It is important to understand this challenging behavior is a manifestation of the impact of trauma during early development rather than the behavior of a willfully disobedient child (Henry et al., 2007).

### *Attachment and Learning*

As previously mentioned, early attachment experiences have great developmental significance within the domains of learning and school-relevant behaviors. This is because attachment experiences have direct effects on early cognitive development. Securely attached infants are free to explore the environment with the expectation their caregiver is available for comfort and safety when needed (Hoffman, Marvin, Cooper & Powell, 2006). Secure attachment relationships promote cognitive development by allowing infants to explore the environment with the assurance that safety and support provided by the caregiver will be available when needed. In contrast, insecure or traumatized infants cannot count on their caregivers to reliably provide comfort and safety, and consequently do not spend as much time in exploratory play.

This aspect of the attachment relationship is important because exploratory play is a vital component of early learning and development in infancy and early childhood (Schulz, Standing, & Bonawitz, 2008). Studies have shown that infants' physical actions and engagement in the world have significant effects on the development of perception

and learning (Schulz et al., 2008). Exploration of the physical and social environment initiates processes that are important for learning new information through trial and error (Schulz et al., 2008). In this way, learning and development are connected through physical 'doing' in infancy and early childhood. The relationship between exploratory play and cognitive development continues well beyond infancy into the school-aged years (Schulz et al., 2008).

### *Learning and School-Relevant Behaviors*

The combination of fetal alcohol exposure and a history of trauma is more damaging to children than trauma alone (Henry et al., 2007). Combined, the neurodevelopmental consequences result in an increased risk for learning disabilities, poor coping strategies, and inability to control emotional responses (Henry et al., 2007). These developmental deficits result in higher levels of negative behaviors because traumatized children are more likely to over-react or shut down in the face of stress (Henry et al., 2007). The challenging behaviors that result can lead to further trauma and stress for the child if adults view the child as willfully disobedient, particularly if adults attempt to control the child's behavior through adverse consequences, punishment, and enforcement of rules (Henry et al., 2007). Unfortunately, traumatized children with poor coping strategies and inadequate problem solving skills are likely to react to such attempts with further oppositional behavior (Henry et al., 2007). In this way, the cycle of conflict is reinforced between the child and the adults responsible for the child's care and education (Henry et al., 2007).

There are more effective ways of dealing with the difficult behaviors seen in traumatized children with FASD. Adults need to understand that for these children, problem behaviors are rooted in traumatic stress, cognitive inflexibility, poor coping behavior and inadequate problem solving skills (Henry et al., 2007). These children are likely to respond positively to safe, non-threatening environments that provide opportunities to build trust and feelings of safety (Henry et al., 2007). These children need learning environments that provide opportunities and support for acquiring and practicing emotion regulation and stress management skills, and that provide opportunities for safe supported exploration of the physical and social environment (Henry et al., 2007). Strategies that create safe supportive learning environments offer traumatized children with FASD the chance to modify their coping strategies and provide these children with the opportunity to experience success in multiple domains.

In order to create a safe learning environment for traumatized children with FASD, adults need to understand these children have limited coping abilities and are often highly stressed. Rather than creating more negative emotional reactions and stress through the use of punishment, sarcasm or scolding, adults should provide caring support when dealing with traumatized children who are struggling with schoolwork, problem behaviours, and/or difficult peer relationships. This change in adults' behaviors and attitudes will create opportunities for traumatized children to learn to respond differently to challenging situations (Henry, 2007).

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