

How trauma and attachment can impact neurodevelopment: Informing our understanding and treatment of sexual behaviour problems†

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Abstract *Over the last several years there has been a notable increase in neurological and neurodevelopmental research, with a keen interest in applying this research to our understanding of everyday human learning and behaviour. One aspect of this research has examined how the experience of trauma in childhood can affect neurodevelopment with implications for later emotional and behavioural functioning. Given that many of the adolescents and adults engaged in treatment for sexually abusive or sexually problematic behaviours present with identified histories of abuse and/or neglect, this research would appear to have particular relevance to our understanding and treatment of a substantial portion of this population. This paper seeks to give a broad introduction to some of this early research and suggests that this work offers the possibility of significantly changing the way clinicians view and treat sexual behaviour problems.*

Keywords *Neurodevelopment; trauma; sexual behaviour problems; treatment*

Introduction

Over the last several years, there have been significant advances in research which have focused upon the development and function of the human brain. Aspects of this research that examine the neurodevelopmental process through childhood and adolescence have garnered widespread scientific and public interest, as it has offered new perspectives on education and parenting and new insights into what influences the decision-making, emotional fluctuations and behaviours of children. Greater understanding of the neurodevelopmental process has dovetailed with progress in understanding the connection between exposure to trauma and the emotional, behavioural and cognitive difficulties exhibited by some children (DeBellis, 2001; Bremner, 2002; Perry, Pollard, Blakely, Baker & Vigilante, 1995; Streeck-Fischer & van der Kolk, 2000).

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Given that a large number of the clients referred to treatment for sexual behaviour problems or sexually abusive behaviour present with significant histories of abuse, neglect and other traumatic experiences (McMakin, Leisen, Cusack, LaFratta & Litwin, 2002), the neurobiology of trauma and its connection to subsequent psychopathology in children and adults would appear to be of direct importance to researchers and clinicians in our field. However, to date, very little of this research has been incorporated into either the assessment or treatment protocols utilized in clinical practice (Fago, 2003; Ryan, 1999).

Brain organization and development

Before we examine the neurodevelopmental research it is useful to outline a basic framework for understanding brain organization and maturation. Looking at the brain vertically, it can be described as being divided into three major regions: the brain stem, the limbic system and the cortex. This perspective on brain development is referred to as the “triune brain” (MacLean, 1990). These regions mature in a hierarchical manner that mirrors their evolutionary development. Therefore, the brain stem matures first and is the oldest while the cortex matures last and from an evolutionary standpoint is the newest region.

The *brain stem* is responsible for regulating basic cardiovascular functions, level of arousal, and some reflexes. Included in this region is the *cerebellum*, which helps to coordinate movement and in turn a variety of social, emotional and cognitive functions. The *limbic system* is referred to frequently as the “emotional brain”, as it functions as the centre for processing urges, appetites and emotions. The limbic system contains a variety of structures important for understanding the individual’s response to stress and trauma. The *amygdala* monitors incoming stimuli for possible threats and stores information regarding threatening stimuli. The amygdala also serves to activate the threat response when danger is detected. The *hippocampus* serves as a hub for memory and learning and appears to be involved in the processing of all conscious memory. The *thalamus* is a structure at the centre of the brain just above the brain stem. It acts as the relay station for incoming stimuli and allows for the senses to be used in combination. The *hypothalamus* lies just below the thalamus, working to maintain homeostasis and functioning as the main centre for information exchange between the brain and the body (Stien & Kendall, 2004, p. 27). When Perry (2002) discusses brain organization he refers to the thalamus and hypothalamus as constituting the mid-brain.

The third region of the brain is the *cortex*, or the “thinking brain”. This is where thinking, reasoning and cognition take place. More recently, in evolutionary terms, the frontal lobes expanded to give us the *prefrontal cortex*. The prefrontal cortex is responsible for the executive functions, which include mediating conflicting thoughts, making choices between right and wrong or good and bad, predicting future events and governing social control, such as suppressing emotional or sexual urges. The prefrontal cortex is the brain centre implicated most strongly in qualities such as sentience, human general intelligence and personality (Stien & Kendall, 2004). Typically, as humans develop, the prefrontal cortex exerts control in regulating limbic and brain stem responses. It serves to develop or “fine-tune” more specific, creative and adaptive problem-solving approaches through the analysis of novel stimuli in the environment and by learning from the outcomes of previous experiences. Many of the difficulties we see in our clients might be understood as stemming from problems of the prefrontal cortex effectively or adaptively processing and regulating limbic responses and other types of sensory input.

The other organizational feature of the brain that becomes important in understanding the impact of trauma is that the brain is divided into two hemispheres, right and left. These

hemispheres are connected at the cortical level by a large tract of neural fibres called the *corpus callosum* and at the subcortical level by the *anterior commissure*. Schiffer (1998) and Ratey (2001) discuss a variety of research studies indicating that the two hemispheres are associated with different functions and characteristics. The left hemisphere is typically the dominant hemisphere for most humans by the time they reach their late adolescence or early adulthood. The left hemisphere specializes in analytical and sequential thinking, and it also tends to be the dominant hemisphere for language. The left hemisphere tends to provide a detailed perspective, whereas the right hemisphere provides a more global perspective. The right hemisphere tends to be involved in processing non-verbal communication, imagery and visual-spatial information, while the left hemisphere largely processes words, verbal communication and numbers. In terms of emotional information, the right hemisphere has been shown to be more involved in negative or pessimistic emotions (e.g. fear, despair), while the left hemisphere mediates the more positive emotions (e.g. happiness, joy). Not surprisingly, the left hemisphere seems to be more involved in the motivation to approach and explore, while the right hemisphere is more inclined to withdraw and avoid. For our further discussion it is important to note that the right hemisphere also appears to be more involved in the experience and recall of trauma (Rauch et al., 1996; Schiffer, Teicher & Papanicolaou, 1995).

While, normally, the two hemispheres work in concert through an exchange and integration of information, different or dominant styles of information processing will clearly have an impact on personality style, emotional expression, preferred problem-solving approaches, skills, interests and a host of other individual strengths and differences.

The neurobiology of trauma

Studies of post-traumatic stress disorder (PTSD) have demonstrated that the age at which a child is first traumatized, the frequency of traumatic exposure and the availability (or lack thereof) of caretakers as supportive resources all have a significant impact on the extent of the psychological consequences experienced by the child. These consequences are expressed frequently through problems with self-regulation, aggression against self and others, problems with attention and dissociation, physical problems, difficulties in self-concept and the capacity to negotiate satisfactory interpersonal relationships (van der Kolk, 2003, p. 293). These studies would suggest that the neurobiological impact of trauma will not express itself through a fixed set of cognitive, emotional or behavioural difficulties/deficits, but rather along a continuum of structural or functional neurological responses influenced by the developmental stage at which the child experiences trauma and the availability of supportive resources provided by primary caretakers to the child.

Bremner (2002) argues that the physiological responses to stress result in common changes in neurological function that underlie the symptoms seen frequently in the aftermath of trauma. Perry and colleagues (Perry, 2001; Perry et al., 1995) suggest that adaptive physiological responses to traumatic experiences become a central feature of how brain structure and function are organized when individuals endure repeated trauma and trauma cues in childhood. They highlight this fact by noting changes in baseline heart rates for individuals with significant trauma experiences.

Research into the neurological consequences of repeated exposure to traumatizing experiences has shown both structural and functional neurological differences between traumatized and non-traumatized individuals. Teicher and colleagues (2002), through their

own work and a review of other studies examining the neurodevelopmental impact of trauma, have identified five major areas where these differences are most pronounced.

Limbic irritability

As noted earlier, the limbic system is the area of the brain that serves to process and regulate sensory information from the brain stem and the mid-brain. It filters or prioritizes information with regard to urges, appetites and emotions that determine what sensory input requires further mental processing (van der Kolk, 2003). In particular, the limbic system will prioritize information relevant to preservation and procreation (Gallistel, Brown, Carey, Gelman & Keil, 1991; Le Doux, 1995). The amygdala, in particular, appraises sensory input relevant to threat, giving an emotional valence to the incoming stimuli that organizes the nature and intensity of the self-protective behaviours deemed necessary. The amygdala initiates autonomic responses such as increased heart rate and blood pressure and activates primary defensive responses such as freeze, fight and flight. This level of defensive responsiveness bypasses the cortex, allowing for immediate responses to strong threat cues (Le Doux, 1994; van der Kolk, 2003).

Teicher et al. (2002) identified increased levels of activation in the amygdala of those individuals with trauma histories when compared to those who had not been traumatized. These persistent levels of amygdala activation generate a kindling effect where the individual can become hypervigilant in scanning for threat cues and over-interprets or misinterprets mildly difficult or even innocuous cues as being significantly threatening. This pattern of amygdala response has a variety of consequences, such as general difficulties in affect regulation; problems in effectively learning from highly charged emotional situations and applying that learning to new or novel stimulus; decreased activation of the speech centre of the brain, contributing to difficulties in expressive/receptive language difficulties and auditory processing; social and relational problems generated by inaccurately reading social cues; and attentional problems generated by a focus on scanning the environment for threat while simultaneously dismissing information as unimportant when it is not viewed as being threat (or safety)-related.

Hippocampus

A part of the limbic system, the hippocampus plays a significant role in verbal and context-related memory. Persistent activation of the amygdala appears to have an inverse effect on the hippocampus, especially the left hippocampus (Teicher et al., 2002). In a variety of clients with PTSD, hippocampal volume was smaller compared to control samples (Bremner et al., 1997). This atrophy in the hippocampus due to persistent stress is believed to be associated with problems in short-term memory, verbal memory, dissociative disorders and context-dependent memory (Bremner, 2002; DeBellis et al., 1999; Stein, Koverola, Hanna, Torchia & McClarty, 1997). Teicher and colleagues (2002) also suggest that the lack of development in the left hippocampus may contribute to the increased language difficulties and lower verbal memory scores seen when samples of abused clients are compared with non-abused controls.

Deficient left hemisphere development

Teicher et al. (2002) found that not only was there underdevelopment in the left hippocampus of abused clients, but a general lack of development and differentiation throughout the left hemisphere. In non-abused controls, Teicher found that the left cortex was more developed

(greater volume, more neuronal growth) than the right, whereas in his sample of clients who had experienced early trauma, the hemispheric asymmetry was found generally to be greater on the right. As noted earlier, the right hemisphere processes more non-verbal emotional communication and imagery, processes more negative emotions, has limited capacity to think analytically and is more motivationally engaged in withdrawal and avoidance. Evidence that traumatized clients may be right hemisphere-dominant combined with indications of less right/left hemispheric integration in the sample of abused clients suggests greater difficulties in analysing and understanding both their own and others' behaviour; decreased verbal skills; greater risk for pathological responses involving anger, fear, avoidance, withdrawal and depression; and a decrease in available coping responses.

Lack of hemispheric integration

Teicher found that during memory recall that there were marked shifts in hemispheric activity. He notes that when adults with an abuse history were asked to recall neutral memories their left hemispheres seemed to be activated, but when they were asked to recall unpleasant or traumatic memories their right hemispheres were predominant. This was compared to Teicher's control (non-abused) sample that appeared to have a predominantly bilateral response (Teicher et al., 2002). Further examination found that the corpus callosum was significantly smaller in the client sample that had experienced early childhood abuse.

Both the underdevelopment of the left hemisphere and the lack of integration between the right and left hemisphere suggests the possibility that experience (and memory) for traumatized individuals may be more compartmentalized, less available for analysis and change (especially through language), and therefore less available for broader learning when those experiences are perceived as more emotionally charged or threatening. This might lead to more rigid and perseverative coping responses that remain despite negative outcomes. It might also lead to that experience by both clinicians and other social supports that the traumatized individual "just doesn't get it", despite a large number of treatment interventions and negative consequences to particular behaviours.

Abnormal activity in the cerebellar vermis

Teicher et al. (2002) noted that not only does the cerebellum play an important role in motor functions such as posture, balance and rhythmic movement, but that the cerebellar vermis also serves in regulating emotional instability by controlling activation and irritability in the limbic system. Everyday evidence for this is available in the soothing side-to-side rocking of an infant by their parent; in the head-to-toe rocking afforded by a rocking chair or swing; or in the activation of rocking movements when many clients are overwhelmed by the immediate experience or triggering of trauma.

Teicher notes that a variety of studies have demonstrated that the cerebellum plays a critical role in attention, language, cognition and affect (Allen et al., 1997; Riva & Giorgi, 2000). In their own studies, Teicher et al. (2002) found that in the individuals with an abuse history there were indications of functional impairment in the activity of the cerebellar vermis.

Attachment theory

In his early formulation of attachment theory, Bowlby (1969) initially described an evolved behavioural process by which the attached person sought out a potentially protective

attachment figure during periods of danger or threat. The primary goal of attachment was seen as being protection and safety. In infancy, these protective figures are identified as being the child's primary caretakers, most frequently the parents, and in most attachment research specifically the child's mother. In later writings, Bowlby integrates information processing with attachment theory, focusing upon patterns of perceiving, representing and utilizing information, especially when that information is tied to danger (Bowlby, 1980; Crittenden, 1997). Bowlby expanded and refined attachment theory to include developmental processes that culminate in adaptive or maladaptive functioning.

Observing toddlers and their mothers in a laboratory experience described as "the strange situation", Ainsworth and colleagues (1978) began to identify distinct attachment patterns, defined generally as secure, avoidant, ambivalent and disorganized. *Secure* behaviour was associated with a history of responsive and nurturing caretaking by the parent. The child experiences their parent as consistently and predictably available to meet both physical and emotional needs. Behaviourally, these children are emotionally and cognitively engaged, using their parent as a secure base from which to explore their environment. *Avoidant* behaviour was associated with a history of rejection, neglect or emotional distance by the caretaker. The child experiences the parent as emotionally unavailable or rigid. Behaviourally, these children present frequently with a blunted or flattened affect or are rigidly responsive to the specific expectations and demands of the environment. *Ambivalent* behaviour was associated with a history of inconsistency by the parent. Behaviourally, these children present frequently as clingy, tense and angry and with greater difficulties around impulse control. Main and Solomon (1990) later described the fourth category of attachment as disorganized. *Disorganized* behaviour was associated with a parent's history of loss or severe trauma and has been found to predominate in children with a history of abuse, neglect and family chaos. Behaviourally, these children present with contradictory approach/avoidance behaviour associated with frightening or frightened behaviour by the parent (Alexander & Anderson, 1997).

Attachment and neurodevelopment

Crittenden argues that the infant attachment patterns are reflected in identifiable patterns of mental processing (Crittenden, 1997). Crittenden proposes a model for understanding attachment that incorporates neuroprocessing with observations of affect and behaviour. She would define *secure* attachment as the ability to integrate effectively the subcortical (limbic and lower brain) emotional responses to environmental stimuli with accurate cognitive transformation and discrimination of those emotions regarding their meaning. *Secure* attachment styles of processing information are likely to yield greater specificity in terms of responses to complex situations, as well as greater flexibility in the individual's capacity to adapt behavioural responses to changing environmental cues. *Avoidant* attachment styles are likely to have developed cortical pathways that may "over-modulate" limbic and lower brain input, creating a limited and often rigid cognitive transformation of emotional stimuli. Cognitive representations of emotions are less specific, less flexible and less responsive to context. *Ambivalent* attachment styles correspond to the development of cortical pathways which "under-modulate" affect-related behaviour. These pathways may respond more quickly and with greater intensity to a broad range of fear-eliciting stimuli. These responses bypass the cortex, leading to less discriminatory inhibition of behavioural responses and, as with the avoidant style, less specificity and flexibility in response to context. Initially for the child, these processing and behavioural patterns may have led to the development of successful strategies for effectively identifying and avoiding/decreasing/resolving dangerous conditions. However,

cognitive attributions which may have been accurate and responses which may have been protective in the context in which they were first learned may prove to be erroneous, maladaptive and even dangerous when applied in a different context. Attachment patterns which cannot integrate affective responses effectively from the limbic system and lower brain with appropriate levels of modulation and adaptation from the cortex create obstacles for individuals in recognizing and/or adapting to changes in context of day-to-day living situations and different relationships.

Crittenden's proposal is especially important when viewed in the context of Teicher et al.'s (2002) findings that trauma experiences impact significantly the level of neural integration in the brain. One of the ramifications of trauma may be the development of neurological obstacles to creating and sustaining secure attachment relationships.

Studies have shown that the ability to regulate emotional responses is an important aspect of effective peer interactions; successful cognitive performance in tasks involving delay, inhibition or pursuit of long-term goals; and the management of stress at home (Galderisi & Mucci, 2000; Mischel & Mischel, 1983; Rubin & Rose-Krasnor, 1986). Rather than simply being a manifestation of the child's innate temperament, more recent studies suggest that emotional reactivity (what clinicians might see described typically as impulsive, explosive, tantruming or intensely avoidant behaviours) results from an interaction of genetic and environmental influences. Primary among these environmental influences is the quality and nature of parental care (Galderisi & Mucci, 2000).

Seigel (1999) argues that emotion is a central organizing process within the brain and that from the infant's perspective the most important aspect of the environment is their emotional connection with their caregiver. Given that the period of helplessness and dependency is far longer for humans than for other species, developing a process for engaging the attention and responsiveness of a caregiver is an essential factor in childhood survival. This capacity to engage and maintain the involvement of a caregiver is the fundamental dynamic of attachment and defines in large part the experience-dependent environment in which neural stimulation, growth and connectedness will occur. Because brain development is geared to progress from lower to higher degrees of complexity and organization, the activity-dependent shaping of brain circuitry through changes in synaptic connections is more prominent during different developmental periods and is different for different circuits and areas of the brain (Galderisi & Mucci, 2000; Greenough, Black & Wallace, 1987). This reinforces our view that it is not simply the presence or absence of severe stressors or trauma in an individual's history that might impact emotional or behavioural control, but also the developmental stage when the trauma occurs, the persistence of the stressors and a variety of other variables which define the environmental context in which the trauma occurs which will effect outcome and possible symptomatology. Again, from an attachment perspective, the most notable of these variables in the individual's early life will be the nature and quality of their attachment relationships.

As noted earlier, the prefrontal cortex is seen as essential for regulating primary sensory and motor responses, and critical periods for its development appear to occur at the end of the first and second years (Huttenlocher, 1979; Schore, 2000). Schore (2001) writes that the prefrontal cortex is highly involved in homeostatic regulation and attachment functions, playing an essential role in processing the interpersonal signals necessary for the initiation of social interaction between individuals. It is a part of the neural network that mediates empathic and emotional relatedness (Balbernie, 2001).

When neurodevelopmental researchers and writers discuss the individual's capacity for transforming or regulating subcortical stimuli for the purpose of a more specified or flexible

cognitive/behavioural response, referred to generally as *executive functioning* skills, it is largely functions centred in the prefrontal cortex to which they are referring.

Through its connection with the limbic system, the prefrontal cortex monitors the state of the body, evaluates meaning and translates sensations into recognizable emotions (Balbernie, 2001). Seigel describes *attunement* between the infant and caretaker as a way in which the caretaker serves initially as an affect regulator, an “auxiliary cortex” for the infant’s still underdeveloped brain (Lott, 2003). Schore (1997) identifies these attunement experiences as being essential for the synaptic development of the prefrontal cortex and suggests that they serve as a template for processing emotional information. He also contends that abuse, neglect and chronic states of mis-attunement lead to an overpruning of synapses in the prefrontal cortex, leaving individuals with an impaired capacity to modulate and regulate emotion in response to threat (Lott, 2003).

The brain is setting up synaptic connections in an activity-dependent manner. If specific brain structures are being activated regularly by abuse and other forms of trauma then those circuits are the ones which are programmed more firmly and activated easily. The amygdala, which sends projections to all areas of the cortex, establishes an emotional bias to cognitive functions. That is, higher-intensity environmental stimuli identified as indicative of reduced safety (or increased sexual arousal) are given privileged attention (Crittenden, 1997; Le Doux, 1995). If threat and trauma persist, the brain stem and mid-brain become under-modulated and the neurobiological responses to trauma (fear/flight, freeze) become established with little influence from cortical control (Balbernie, 2001).

Appropriately integrated levels of cortical control, centred primarily in the frontal cortex, can therefore be seen as essential for establishing arousal and impulse control, attunement, empathy and a recognition of the impact and consequences of one’s behaviour. One might argue that these are exactly those issues which we attempt to address in our treatment of sexual behaviour problems.

Implications for treatment

Much of the research identifying the impact that trauma may have on neurodevelopment and on the function of specific areas of the brain is relatively new. However, considerable writing and research on language deficits, executive functioning problems, attachment difficulties and trauma-focused treatment in relation to children with abuse histories and behavioural difficulties has been available for a number of years (Crittenden, 1997; Foa, 1997; Lynam, Moffitt & Stouthamer-Loeber, 1993; Lyons-Ruth, Alpern & Repacholi, 1993; Perry, 1997; Sroufe, 1988). To a large degree, the more current research has supported and elaborated upon the neurological underpinnings of processing or behavioural difficulties identified in earlier writings.

While this research is clearly pertinent to treating children and adolescents exhibiting sexual behaviour problems, it has not been integrated generally into assessment or treatment protocols (Creeden, 2005; Fago, 2003). Recently, there has been discussion of broadening our treatment perspective or developing more “holistic” approaches to treatment (Longo, 2002; Ryan, 1999), but there is little evidence that these discussions have resulted in widespread changes to how we conceptualize or treat sexual behaviour problems in adolescents (Burton, Smith-Darden, Levins, Fiske & Longo, 2000). To a large degree, cognitive behavioural models including the Relapse Prevention Model (Pithers, 1990) continue to dominate both the structure and the specific interventions of treatment programmes for adolescent and adult abusers, despite concerns that these models have some serious limitations (Chaffin &

Friedrich, 2000; Laws, Hudson & Ward, 2000; Ward & Hudson, 1996). I believe that a working understanding of the research on the neurological impact of trauma coupled with a theoretical approach garnered from both the trauma and attachment fields supplies a framework for assessment and treatment with our population that is both developmental and holistic.

I have described previously one possible treatment model that attempts to integrate both the trauma and attachment research into a programme for treating sexual behaviour problems in children and adolescents (Creeden, 2004, 2005). This treatment model uses as its framework a phase-orientated trauma treatment approach and attempts to integrate interventions from biofeedback, eye movement desensitization and reprocessing (EMDR) therapy, drama therapy, dialectical behaviour therapy (DBT), occupational therapy and cognitive-behavioural treatment, among others. However, rather than argue for a specific treatment model, I feel it is more important to identify assessment and treatment considerations, which could be incorporated into a wide range of treatment approaches that take into account the neurological impact of early trauma and attachment issues.

Arousal control/regulation

One of the primary considerations in the work with sexual abusers has been in identifying, diminishing or eliminating “deviant” arousal patterns. Primarily, this work has looked at sexual arousal to a variety of stimuli (e.g. young children, violence, etc.) that was identified at placing the individual at risk for engaging further in abusive behaviours. Masturbatory satiation, aversion therapies and cognitive-behavioural approaches (e.g. Stop and Switch stories, tapes) have all attempted to identify the sexual stimulus or trigger and then make that stimulus less appealing or reinforcing.

What the neurological research appears to suggest and our own experience more frequently bears out is that the children and adolescents we treat have problems with arousal control in general, as opposed to sexual arousal difficulties in particular. Often, we witness sexually inappropriate behaviour stemming from generalized anxiety or arousal states which can become sexualized as one of a variety of options for discharging or addressing the arousal (physical and verbal aggression, self-injury, eating and dissociation are among other options). The triggers or precipitants for these anxiety or arousal states are not necessarily or even predominantly sexual. Because the range of stimuli which might trigger anxiety/arousal can be quite broad, a focus on broad-based arousal control and regulation would appear to be an important element of treatment.

In this regard we have found that clients have difficulty identifying accurately when their arousal states are high. We have begun the use of biofeedback approaches both to help clients recognize increased arousal and also as a tool which will allow them to monitor success and progress in using particular arousal control interventions (e.g. yoga, breathing, movement, weighted vests and visualization).

I also feel that the neurological research which identifies higher levels of amygdala activity with consequent higher levels of autonomic arousal states (Perry, 2001; Teicher et al., 2003) raises questions about the conclusions we draw from the physiological measures utilized currently in assessment and treatment. As the field continues to incorporate polygraphs, viewing time and plethysmography into its assessment and treatment protocols, I believe we need to understand fully the neurological response to trauma and trauma cues and incorporate that understanding into interpreting the result of these assessments.

Language deficits

If we examine past research showing evidence of significant verbal and performance IQ differences in delinquent populations, and the more recent neurological findings of language difficulties stemming from the lack of left hemisphere development and differentiation in those who experience early and persistent trauma, consideration should be given to how receptive/expressive language disorders and auditory processing disorders impact our clients' ability to effectively utilize treatment. As most treatment approaches with adolescents and adults tend to be loaded strongly with the need to process language, we may be using a modality for therapy that is least accessible to our clients. In addition, as many of the children and adolescents with whom we work come from families with histories of trauma and abuse, we are likely to be treating or giving information to parents who might also have serious obstacles in processing verbal information effectively.

Consideration should be given to making all aspects of the treatment process multimodal (verbal, visual, movement, kinesthetic, music). This should not only encourage greater degrees of integrating the treatment experience/information; it also serves to help clients feel more competent, motivated, involved and understood throughout the treatment process.

Language problems not only have an impact on academic performance and treatment involvement, but also impact work performance, organization, attention, the capacity to respond to compliance commands (behaviour) and almost every other facet of social interaction. Because language problems can create a wide range of obstacles to daily living and treatment success, consideration should be given to including a screening for auditory processing difficulties and other language-based problems as a standard part of assessment protocols.

Executive functioning skills

Impulsivity, disorganization, rigidity in problem-solving approaches, misreading social cues and poor attention and concentration are seen frequently as problems to be addressed in our treatment population. Many of the children, adolescents and adults whom we treat present with a diagnosis of attention deficit disorder. Quite often, we rely upon pharmacological interventions to address these issues or develop behaviour management interventions to address the behavioural problems resulting from these difficulties. The underlying assumption of many of these behaviour management programmes is that the disruptive behaviour stems from a lack of motivation on the part of the individual, and therefore the right combination of consequences and reinforcers will induce the individual to engage in better behaviour.

Neurological research would suggest that a child's trauma and attachment history may have a significant impact on the development, integration and functioning of the prefrontal cortex, an area of the brain that is highly involved in these executive functioning skills.

These executive functioning difficulties, along with the behavioural problems they may generate, might best be viewed as obstacles that the client must manage and/or overcome rather than simply bad choices which the client must learn to change. In this light, some assessment of executive functioning skills might be considered as a regular part of the evaluation process, and interventions to help the client increase their capacity for concentration, organization, flexible problem-solving, etc. can also be developed in response to the outcomes of these evaluations. Some of these capacities will improve by helping the client decrease their overall level of anxiety and arousal. Other areas (e.g. organizational skills) will help the child/adolescent feel less overwhelmed and confused and generally more competent and in control. The difference, I believe, is understanding that these children may have real deficits in these areas and therefore

need specific interventions to improve these skills if they are to make better behavioural choices in the future.

Trauma

Historically, our field has sought to separate the trauma experiences of our clients from the abuse they have inflicted on others. Many treatment approaches continue to demand that a client address their abusing/offending behaviour before they can talk about their own victimization histories. I would suggest that our clients' trauma experiences are intertwined strongly with their abusive behaviour and not just, or even primarily, from a social-learning perspective. Consideration might be given to the notion that our client's abusive behaviour is linked to their own trauma histories through anxiety, fear, abandonment, anger, shame and other frequently overwhelming affective states. The experience of these overwhelming emotional states might also be the source of some of the cognitive distortions, incomplete memory or detail in offence reporting, lack of emotional integration or response and many of the other presentations we identify in our clients as being avoidant behaviours.

As opposed to thinking that addressing a client's trauma history will inhibit or delay their ability to take responsibility for their own abusive behaviour, I have come to believe that not addressing the impact of the client's own trauma will simply impede the learning and effective use of skills we are teaching them to control/change their inappropriate and abusive behaviour (Creeden, 2004). Examining how a phase-orientated trauma treatment model might be adapted to address sexual behaviour problems is a worthwhile endeavour for the offender treatment field in general to consider. I believe that adopting a more trauma-focused approach might be especially productive for treating children and adolescents with sexual behaviour problems.

Conclusion

There are ongoing advances in our ability to examine and understand the neurodevelopmental process and specific neurological functions. Our understanding of this research literature offers possibilities for changing the way we understand sexually abusive and inappropriate behaviour, as well as informing changes in both our assessment protocols and treatment interventions. For me, this research leads me to view our clients' trauma histories and attachment relationships as essential elements in treating abusive behaviour and it induces me to examine research and treatment approaches from a variety of fields and disciplines that might prove useful in addressing neurological obstacles and attachment difficulties. Finally, I believe this perspective of looking at sexual behaviour problems offers an optimistic context for developing proactive, preventive interventions for young children who experience trauma and attachment problems in their lives.

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