

Correspondence: Ella Maria COSMOVICI IDSØE

E-mail: ella.m.idsoe@uis.no

Date of Submission: July, 18, 2012 / Acceptance: August, 27, 2012

COMPLEX TRAUMA IN CHILDREN – NEUROBIOLOGICAL AND PSYCHOPEDAGOGICAL IMPLICATIONS

Ella Maria COSMOVICI IDSØE, Nicolae COSMOVICI

Ella Maria COSMOVICI IDSØE – Senior Psychologist, Ph. D., Associated Professor Centre for Behavioural Research, University of Stavanger, Stavanger, Norway

Nicolae COSMOVICI – Psychologist, Ph. D., Associate Professor, “University Petre Andrei of Iași”, Iași, Romania

ABSTRACT:

Experiencing traumas during childhood can have a major impact on the emotional, behavioral, cognitive, social and physical functioning of children. Mental health professionals have long been aware of the psychological effects of traumatizing experiences and a common diagnosis in such cases is Post-traumatic Stress Disorder (PTSD) as defined in DSM-IV-TR (APA 2000). However, childhood experiences can be so complex that they give rise to more complex reactions than those captured in the PTSD diagnosis. But even if we recognize the warning signs of a childhood trauma and correctly diagnose the post-traumatic stress, we still need to understand the neurobiological effects of trauma in order to effectively treat its consequences. This article reviews the scientific literature focusing on traumatic experiences in children. The authors intend to offer an understanding of complex traumas, with a particular focus on its effects on brain functioning. Studies using magnetic resonance imaging (MRI) found reduced hippocampal volume in neglected children (B. Perry, 1997); a diminished hippocampal size may be either a consequence of trauma exposure or a risk factor for the development of psychiatric complications following trauma exposure. Modern research is stressing major alterations of complex neurobiological systems of processing basic information and of mediating autonomic, immune and endocrine defensive reactions. In the same time, the authors explore the existing strategies which promote recovery for traumatized children as well as the psycho-pedagogical implications. This knowledge can assist professional helpers in order to better identify, understand, support and empathise with traumatised children.

Keywords: *complex trauma, PTSD, trauma and learning, posttraumatic biopsychopedagogical interventions*

REZUMAT:

Experimentarea traumelor în timpul copilăriei poate avea un impact major asupra funcționării emoționale, comportamentale, cognitive, sociale și fizice a copiilor. Profesioniștii din sănătatea mintală au fost de mult timp conștienți de efectele psihologice ale experiențelor traumatizante, un diagnostic comun în astfel de cazuri fiind acela de tulburare de stres posttraumatică (PTSD), așa cum este aceasta

definită în DSM-IV-TR (APA, 2000). Cu toate acestea, experiențele din copilărie pot fi atât de complexe, încât dau naștere la reacții mai complexe decât cele cuprinse în diagnosticul PTSD. Dar chiar dacă recunoaștem semnele de avertizare ale unei traume din copilărie și diagnosticăm corect tulburarea de stres post-traumatică, avem încă nevoie să înțelegem efectele neurobiologice ale traumei, în scopul de a-i trata, în mod eficient, consecințele. Acest articol trece în revistă literatura de specialitate, concentrându-se pe experiențele traumatiche la copii. Autorii intenționează să ofere o nouă perspectivă asupra complexității traumei, cu un accent special pe efectele sale asupra funcționării creierului. Diverse studii folosind imagistica prin rezonanță magnetică (IRM) au constatat o reducere de volum a hipocampusului la copiii neglijăți (B. Perry, 1997), o diminuare a dimensiunilor hipocampusului putând fi însă și o consecință a expunerii la traume sau a unui factor de risc pentru dezvoltarea de complicații psihiatrice, ca urmare a expunerii la traumatisme. Cercetările moderne au evidențiat modificări majore ale sistemelor complexe neurobiologice de prelucrare a informațiilor de bază și de mediere a reacțiilor vegetative de apărare, imunitare și endocrine. În același timp, autorii explorează strategiile existente, care promovează recuperarea pentru copiii traumatizați, precum și implicațiile psiho-pedagogice. Aceste cunoștințe îi pot ajuta pe asistenții profesioniști să identifice, să înțeleagă, să susțină și să empatizeze mai bine cu copiii traumatizați.

Cuvinte-cheie: *traumatisme complexe, PTSD, traumă și învățare, intervenții postraumatice biopsihopedagogice*

INTRODUCTION

What is complex trauma and PTSD?

The topic of childhood trauma has come into societal awareness in the last couple of years and researchers all over the world are trying to expand the understanding of trauma and to refine its perspective. The term of “complex trauma” refers to children’s experiences of multiple, chronic and prolonged developmentally traumatic events including emotional abuse and neglect, sexual abuse, physical abuse and witnessing domestic violence which begin in early childhood (van der Kolk, 2005).

One of the reasons for enhanced research focus on this topic is that experiencing traumas in childhood can have a major impact on the biopsychosocial and cognitive functioning of the children (Burns et al., 1998; Cook et al., 2005; Spinazzola et al., 2005). Numerous studies have documented both short-term (Danielson et al., 2010; Zinzow, Ruggiero, Resnick, Smith & Saunders, 2009) and long-term (Irish, Kobayashi & Delahanty, 2010) devastating consequences of trauma exposure in childhood, including (PTSD) the Posttraumatic Stress Disorder which is the diagnosis that specifically identifies trauma as an antecedent. In order to get the PTSD diagnosis, one must have six key diagnostic criteria (labelled A through F in the DSM-IV-TR). A severe trauma (A) must cause clinically significant distress (F) for more than a month (E). The trauma (A) has two components. The A1 criterion states that “the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others”, while the A2 criterion states that “the person’s response involved intense fear, helplessness, or horror”. Furthermore, symptoms occur within three clusters, “the traumatic event is persistently re-experienced” (B), there is “persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness” (C), and there are “persistent symptoms of increased arousal” (D) (APA, 2000; Rubin et al., 2008) DSM, pp. 467 – 468.

Researchers and practitioners found out that the impact of complex trauma goes beyond post-traumatic stress alone, typically occurring in a number of domains – biological, attachment, affect regulation, dissociation, cognitive, behavioral control, and self-concept. Children exposed to trauma might be diagnosed with PTSD, major depression, and/or some form of anxiety disorder, but these diagnoses capture only a limited aspect of the traumatized child’s complex self-regulatory and relational impairments (Cook et al., 2005).

The PTSD diagnosis doesn’t fully capture the spectrum of posttrauma symptoms, particularly among children which are often traumatized in the context of relationships. And unfortunately, many of them are misdiagnosed or get “comorbid diagnosis” or are incorrectly treated (D’Andrea et

al., 2012). This is the reason why practitioners and researchers have been working together trying to reduce the diagnostic confusion and increase targeted treatment approach. The diagnosis of “Developmental trauma disorder” (DTD) has been proposed to be included in the next forthcoming DSM revisions (van der Kolk & Pynoos, 2009, D’Andrea et al., 2012). The new diagnosis would be applied for children that were exposed to multiple, chronic traumas, usually of an interpersonal nature; children that will present a unique set of symptoms that differ from those of PTSD (biopsychosocial dysregulation) and the fact that these traumas have a different impact on children depending on their stage of development (*ibid.*).

New findings in Neurobiology

The new proposed diagnosis is based on the recent findings from neurobiology which help us better depict the effects of complex trauma in childhood and the need for proper therapeutical interventions that suits the needs of these children.

Psychological trauma involves a significant neurologic activity. When we feel that our life is threaten, our survival responses are set in activity by the area in the temporal lobe called *the limbic system*. The limbic system plays a major role in storing all our emotional, sensorial and relational experiences. The same limbic system in its structure the hippocampus which is an important memory processing center and the amygdala, which is the brain’s “fire alarm” system in front of danger. These structures in the brain are overactivated in children that experienced early complex trauma, so that the result is a maladaptive persistence of a fear state. The brain of these children is more irritable, impulsive, suspicious, tense, focused on threat-related cues (typically non-verbal), anxious (Perry et al., 1995; Perry, 2006).

Our autonomic nervous system was designed to be on the lookout for danger and keep us safe. The problems appear when the pain and traumatic residue remains in the body long after the event is over and the brain cannot discriminate between what is in the past and what is real, present threat. Complex traumatized children are in constant state of alarm, looking for danger in the environment, alternating between being easily triggered and highly sensitized and feeling numb and disconnected from themselves or the other people (Streeck-Fischer & van der Kolk, 2000).

A very important research finding shows that traumatized children have smaller brains after you control for body size and head size compared to kids who’ve not been traumatized. Several studies have found that the white matter, the tissue in the brain that makes connections within the neuron-rich gray matter, is diminished in traumatized children (Perry, 2002; Putnam, 2006; Mehta et al., 2009; McCrory et al. 2010). This means actually that if you have fewer neurons than you make fewer connections and fewer connections means a low I.Q.

New findings in neuroscience show that the brain maintains its plasticity throughout the lifespan and not only during crucial developmental periods (Boyke, 2008; Engvig, 2010). This means that the traumatized brain can grow new connections and create new neuronal pathways *via* therapy, which will help to bring the nervous system back into balance and escape from the traumatic experience.

Therapeutical trauma interventions

There are many developed therapeutical options for traumatized children like cognitive behavioural therapy, individual insightoriented psychotherapy, family therapy, group therapy, play or art therapy, eyemovement desensitization and reprogramming (EMDR), and pharmacotherapy. Each of these interventions has some promising results and many disappointments. Maybe one of the most important information from the neurobiological research is that interventions will fail if they address to a dysregulated nervous system and that the first step in therapy is to make children feel safe, to help them keep their arousal level at a manageable degree.

In the light of the new discoveries from neurobiology, the trauma practitioners have been trying to switch the therapeutical interventions from treating events through narrative recall to treating the effects of those events as they repeatedly occur in response to reminders (triggers) of the original trauma (van der Kolk, 2003). In order to transform a traumatic memory, there should be a

change in the mind-body responses to that memory or to activate the frontal lobes, so that they interpret different the responses, more as a sensation than a threat. Among the new techniques that cultivate new responses to old stimuli or helps with processing the cortical and subcortical components of unresolved events, we mention here the EMDR techniques, such as Developmental Needs Meeting (Schmidt, 2000) and Resource Development (Korn and Leeds, 2001).

In an effort to calm the nervous system of their clients and help them imagine new responses and experiences, more and more therapists are using somatic and energy therapies. One of the most promising therapies among the body-centered therapies for trauma is the Sensorio-motor Psychotherapy (see Ogden, Minton & Pain, 2006) which combines traditional talking therapy techniques with body-centered interventions that directly address these neurobiological effects of trauma.

Psychopedagogical interventions

Many researchers and practitioners underline the fact that what helps most in healing traumatized children is increasing the number of healthy relationships. Positive, nurturing and caring interactions with peers, teachers and caregivers will increase the healing chances especially for children with attachment disorders (Perry, 2006).

Children spend many hours, every day, in the school environment and teachers are in the best position to identify and help traumatized children. Schools can create trauma-sensitive environments in an effort to reduce the impact of trauma and help traumatized children learn. The intention is not to transform teachers into therapists, but to include some therapeutical principles into the classroom environment (Cosmovici-Idsøe & Idsøe, 2011).

We need to empower teachers with knowledge about how they can identify traumatized children, about how these children feel, think and behave. A large amount of recent psychological and neurobiological research connects exposure to trauma to learning and behavior problems, including difficulties in the following areas: language, communication, and problem solving skills; understanding cause-and-effect relationships; executive functioning; regulating emotions; and peer and teacher relationships (Perry, 2001; Wallace & Gregory, 2005; Streeck-Fischer & van der Kolk, 2000; Burack et al., 2006). Trauma is also linked to an increase in impulsivity and aggressiveness (Shields & Cicchetti, 1998; Ethier, Lemelin, & Lacharite, 2004). Children experiencing trauma can have a difficult time concentrating, following lessons, and sitting still (Beers & De Bellis, 2002; Streeck-Fischer & van der Kolk, 2000). In other words, a traumatized child can have trouble behaving and learning.

Teachers need to know when they should refer these children to the specialist, how to calm down an overactivated traumatized child so that he could learn, because as we could see, from the neurobiological explanations mentioned earlier, you can't appeal to these children's rational brain, while their emotional brain is hyperactivated. Furthermore, teachers need to identify what triggers children's fear reactions at school, how they can adjust the learning and the environment to suit the needs of the traumatized brain. Last, but not least, how they can in an optimal way build relations with such a child.

IN CONCLUSION, we recommend schools to create trauma sensitive environments by creating school supportive cultures, where children feel physically and emotionally safe by developing trauma sensitive school policies and procedures, by modifying the instruction to benefit traumatized children and by strengthening relationships between school personnel and traumatized children.

The latest research in neurobiology presented in this study helps us understand how trauma affects the brain and how understanding the persistence of fear related emotional, behavioural, cognitive and physiologic patterns should lead to more targeted therapeutic interventions that would modify the parts of the brain affected by trauma. We believe that future clinical and research efforts in the trauma field will start to define and use child specific and neurodevelopmentally informed models to guide assessment, intervention, education, therapeutics and policy.

ACKNOWLEDGMENTS AND DISCLOSURE

The authors declare that they have no potential conflicts of interest to disclose.

REFERENCES:

1. APA (2000). Diagnostic and statistical manual of mental disorders (Text revision) (4th ed.). Washington, D.C.: American Psychiatric Association.
2. Beers, S. R. & De Bellis, M. D. (2002). Neuropsychological function in children with maltreatment-related Posttraumatic Stress Disorder. *American Journal of Psychiatry*, 159, 483-486.
3. Burack, J. A., Flanagan, T., Peled, T., Sutton, H. M., Zygmuntowicz, C. & Manly, J. T. (2006). Social perspective-taking skills in maltreated children and adolescents. *Developmental Psychology*, 42, 207-217.
4. Burns, B. J., Hoagwood, K., Maultsby, L. T., Epstein, M. H., Kutash, K. & Duchnowski, A. (1998). Improving outcomes for children and adolescents with serious emotional and behavioral disorders: Current and future directions. In M. Epstein, K. Kutash & A. Duchnowski (Eds.), *Outcomes for children and youth with emotional and behavioral disorders and their families: Programs and evaluation best practices* (pp. 685 – 707). Austin, TX: PRO-ED.
5. Boyke, J. et al. (2008). Training-induced brain structure changes in the elderly. *J. Neurosci.* 28, 7031 – 7035
6. Cook, A., Spinazzola, J., Ford, J., Lanktree, C., Blaustein, M., Cloitre, M., van der Kolk, B. (2005). Complex trauma in children and adolescents. *Psychiatric Annals*, 35, 390 – 398.
7. Cosmovici-Idsoe, E. & Idsoe, T. (2011). *Hva kan pedagoger/skolepersonell gjøre med stress og andre konsekvenser som rammer barn og unge som mobbes?* I U.V. Midthassel, E. Bru, Ertesvåg, S. & E. Roland (eds.) *Sosiale og emosjonelle vansker – barnehagens og skolens møte med sårbare barn*. Oslo: Universitetsforlaget.
8. D'Andrea, W., Ford, J., Stolbach, B., Spinazzola, G., van der Kolk, B. (2012). Understanding Interpersonal Trauma in Children: Why We Need a Developmentally Appropriate Trauma Diagnosis, *American Journal of Orthopsychiatry*, Vol. 82, No. 2, 187 – 200
9. Danielson, C. K., Macdonald, A., Amstadter, A. B., Hanson, R., de Arellano, M. A., Saunders, B. E. & Kilpatrick, D. G. (2010). Risky behaviors and depression in conjunction with – or in the absence of – lifetime history of PTSD among sexually abused adolescents. *Child Maltreatment*, 15, 101 – 107.
10. Engvig, A. et al. (2010). Effects of memory training on cortical thickness in the elderly. *Neuroimage* 52, 1667 – 1676.
11. Ethier, L. S., Lemelin, J. P., & Lacharite, C. (2004). A longitudinal study of the effects of chronic maltreatment on children's behavioral and emotional problems. *Child Abuse and Neglect*, 28, 1265 – 1278.
12. Freedman, M. (2010). Review of Developmental Trauma Disorder proposal to the APA. Downloaded 21.09.2010: www.goodworksinttrauma.org/blog/wp.../DTD-final-rejection-by-APA.pdf.
13. Irish, L., Kobayashi, I. & Delahanty, D. L. (2010). Long-term physical health consequences of childhood sexual abuse: A meta-analytic review. *Journal of Pediatric Psychology*, 35, 450 – 461.
14. Korn, D. & Leeds, A. (2001). Resource development and installation. *Journal of clinical psychology*.
15. McCrory, E., DeBrito, S. A., Viding, E. (2010). Research Review: The neurobiology and genetics of maltreatment and adversity. *Journal of Child Psychology and Psychiatry* 51:10, pp. 1079 – 1095
16. Mehta, M. A., Golembo, N. I., Nosarti, C., Colvert, E., Mota, A., Williams, S. C. R., et al. (2009). Amygdala, hippocampal and corpus callosum size following severe early institutional deprivation: The English and Romanian Adoptees Study Pilot. *Journal of Child Psychology and Psychiatry*, 50, 943 – 951.
17. Navalta, C. P. (2011). Neuropsychological aspects of child abuse and neglect. In A. S. Davis (Ed.), *Handbook of pediatric neuropsychology* (pp. 1041 – 1050). New York: Springer.
18. Ogden, P., Minton, K. & Pain, C. (2006). *Trauma and the body: a sensorimotor approach to psychotherapy*. New York: W. W. Norton
19. Perry, B. D., Pollard, R., Blakely, T., Baker, W., Vigilante, D. (1995). Childhood trauma, the neurobiology of adaptation and 'use-dependent' development of the brain: how "states" become "traits". *Infant Mental Health Journal* 16 (4): 271-291.
20. Perry, B. D. (1997) Incubated in Terror: Neurodevelopmental Factors in the 'Cycle of Violence' In: *Children, Youth and Violence: The Search for Solutions* (J Osofsky, Ed), Guilford Press, New York.
21. Perry, B. D. (2001). The neurodevelopmental impact of violence in children. In D. Schetky & E. P. Benedek (Eds.), *Textbook of child and adolescent forensic psychiatry* (pp. 221 – 238). Washington, D. C.: American Psychiatric Press, Inc.
22. Perry, B. D. (2002). Childhood experience and the expression of genetic potential: What childhood neglect tells us about nature and nurture? *Brain and Mind*, 3, 79 – 100.
23. Perry, B. D. (2006). Applying principles of neurodevelopment to clinical work with maltreated and traumatized children: The neurosequential model of therapeutics. In N. B. Webb (Ed.), *Working with traumatized youth in child welfare* (pp. 27 – 52). New York: The Guilford Press.

24. Putnam, F. W. (2006). The impact of trauma on child development. *Juvenile and Family Court Journal*. National Council of Juvenile and Family Court Judges. Retrieved June 2009 from www.ncjfcj.org/images/stories/dept/publications/winter%2006_putnam.pdf
25. Rubin, D. C., Boals, A. & Berntsen, D. (2008). Memory in posttraumatic stress disorder: properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology*, 137(4), 591 – 614. doi:10.1037/a0013165.
26. Schmitt, S. J. (2000). *Developmental needs meeting strategy for EMDR therapists*. Houston: DNMS Institute.
27. Shields, A. & Cicchetti, D. (1998). Reactive aggression among maltreated children: The contributions of attention and emotion dysregulation. *Journal of Clinical Child Psychology*, 27, 381-395.
28. Streeck-Fischer, A. & van der Kolk, B.A. (2000). Down will come baby, cradle and all: Diagnostic and therapeutic implications of chronic trauma on child development. *Australian and New Zealand Journal of Psychiatry*, 34, 903-918.
29. Spinazzola, J., Ford, J. D., Zucker, M., van der Kolk, B. A., Silva, S., Smith, S. F. & Blaustein, M. (2005). Survey evaluates complex trauma exposure, outcome, and intervention among children and adolescents. *Psychiatric Annals*, 35, 433 – 439.
30. Zinzow, H. M., Ruggiero, K. J., Resnick, H., Smith, D. & Saunders, B. (2009). Prevalence and mental health correlates of witnessed parental and community violence in a national sample of adolescents. *Journal of Child Psychology and Psychiatry*, 50, 441 – 450.
31. van der Kolk, B. A. (2003). Neurobiology of childhood trauma and abuse. *Child and Adolescent Psychiatric Clinics*, 12, 293 – 317.
32. van der Kolk, B. A. (2005). Developmental trauma disorder. *Psychiatric Annals*, 35:5, 401 – 408.
33. van der Kolk, B. A. & Pynoos, R. S. (2009). Proposal to include a developmental trauma disorder diagnosis for children and adolescents in DSM-V. Retrieved from: www.cathymalchiodi.com/dtd_nctsn.pdf.