

The Impact of Maltreatment on the Developing Child

Dana M. Hagele, MD, MPH

Overview

Childhood, from infancy to adolescence, is a time of enormous neurological growth and development. Child maltreatment—including physical, sexual, and emotional abuse; neglect; and exposure to domestic violence—represents an *extreme traumatic insult* to the developing child. Specifically, maltreatment results in disruption of the bond between child and caregiver, and it causes up-regulation of the biological stress response system. Chronic traumatic exposure may then lead to persistent changes in brain structure and chemistry. Current research suggests that these biological alterations contribute to long-term physical, emotional, behavioral, developmental, social, and cognitive dysfunction seen in adults who have experienced childhood maltreatment. As described by DeBellis, the “psychobiological sequelae of child maltreatment may be regarded as an environmentally induced, complex developmental disorder.”¹

Child Maltreatment: Biological Pathways to Adverse Outcomes

Immediate Alterations in Brain Chemistry

The psychological trauma of maltreatment triggers the complex neurochemical and hormonal systems involved in the stress response and in emotional regulation. When a child experiences an abusive insult, in their glucocorticoid, noradrenergic, and vasopressin-oxytocin systems² are activated; this highly adaptive response allows for survival in a dangerous environment. Chronic activation, however, may result in permanent changes in

brain chemistry, structure, and function. Over time, maltreated children are at risk for the development of an exaggerated response to relatively minor stress. Compounding this insult, maltreated children are forced to respond to environmental threats (family violence), rather than engaging in activities necessary for the development of complex emotional, behavioral, and cognitive functioning.

“Recent neuroimaging studies demonstrate that neuroanatomy is significantly altered among individuals who have experienced childhood maltreatment and abuse-related Posttraumatic Stress Disorder.”

Persistent Alterations in Brain Structure and Function

Recent neuroimaging studies demonstrate that neuroanatomy is significantly altered among individuals who have experienced childhood maltreatment and abuse-related Posttraumatic Stress Disorder (PTSD).³ For example, children diagnosed with maltreatment-related PTSD have reduced cerebral volume

(prefrontal white matter, right temporal lobe, and mid-section of the corpus callosum), and associated enlargement of the ventricular system.⁴ This finding indicates significant neuronal loss, and therefore, lost potential for child growth, development, and functioning. Studies have shown alterations in the pituitary⁵ and hippocampus⁶ of children with PTSD; this demonstrates a possible link between the trauma of child abuse, resultant changes in brain anatomy, and adverse effects on learning and memory.⁷

Chronic or extreme maltreatment may result in altered neurophysiology and neuroanatomy through persistent activation of the hypothalamic-pituitary-adrenal axis (HPA) and the catecholamine stress system. For example, women with a history of childhood sexual abuse exhibit HPA-axis abnormalities (cortisol suppression following dexamethasone challenge) comparable to that of adults with combat-related PTSD.⁸ Similarly,

Dana M. Hagele, MD, MPH, is a Consulting Physician for the North Carolina Child Medical Evaluation Program. She can be reached at dana_hagele@med.unc.edu or at 208 North Columbia Street, Suite 200, Chapel Hill, NC 27514. Telephone: 919-843-9365.

children with a history of sexual abuse show evidence of higher catecholamine functional activity, which manifests as physiological agitation.⁹ Finally, children with a history of maltreatment-associated PTSD demonstrate characteristic changes in cerebral blood flow patterns,¹⁰ as well as characteristic alterations in regional activation of the brain.¹¹ These findings offer a neurophysiological explanation for the behavioral and emotional changes seen in children with histories of abuse.¹²

Child Maltreatment: Intermediate and Long-Term Outcomes

Impact on Child, Family, Community, and Society

Child maltreatment, and the associated disruption of secure parent-child attachment, represents a severe traumatic exposure comparable to that of military combat. The initial physiological and behavioral response to abuse may be appropriate and adaptive. However, if the trauma is severe or chronic, persistent changes in neuroanatomy and neurophysiology may occur, often leading to the development of psychiatric disturbance, particularly depression and PTSD. Ultimately, maltreatment and its associated morbidities predict adverse short- and long-term outcomes across physical, developmental, cognitive, emotional, behavioral, and social functional domains.

General Medical Problems and High-Risk Health Behaviors

Adults and adolescents with a history of childhood abuse, neglect, or domestic violence exposure, demonstrate nearly twice the number of serious health problems as children without these experiences.¹³ Documented medical problems associated with childhood maltreatment include: chronic fatigue;¹⁴ altered thyroid function;¹⁵ altered immune function;¹⁶ eating disorders and obesity;¹⁵ asthma;¹⁶ hypertension,¹⁷ and peptic ulcer disease.¹⁸ Similarly, these exposures increase the likelihood of high-risk health behaviors among men and women, including: a higher number of lifetime sexual partners;¹⁹ increased male involvement in teen pregnancies;²⁰ higher incidence of unprotected sex with partners of unknown HIV status;²¹ younger age at first voluntary intercourse;²³ diminished birth control efficacy;²² younger age at the birth of the first child;²² and greater likelihood of becoming a teen mother.²² Similarly, childhood maltreatment is predictive of significantly higher levels of alcohol and substance abuse disorders.²³⁻²⁷

Developmental Dysfunction and Mental Health Disorders

Children with a history of maltreatment frequently demonstrate significant deficits across developmental and cognitive domains, ultimately affecting educational performance. Specifically, maltreated children demonstrate deficits in attention, abstract reasoning, impulse control, and long-term memory for

verbal information.¹² Similarly, traumatic exposure is associated with significant decrease in IQ.²⁸ Due to overlapping cognitive, behavioral, and emotional symptomatology, childhood PTSD may resemble Attention-Deficit Hyperactivity Disorder (ADHD) or other learning disabilities in the classroom.

Child abuse and neglect are independently associated with the development of adolescent and adult mental health disorders. This effect is mediated, in part, through persistent stimulation of biological stress systems, as well as through the development of PTSD. Mood and anxiety disorders are most prevalent among this population;^{29,30} between one-third and one-half of all abused children meet the Diagnostic and Statistical Manual of Mental Disorders³ criteria for PTSD.³¹⁻³³ In addition to the development of mental health disorders, maltreatment is associated with the development of co-morbid personality disorders.³⁵ Overall, child maltreatment and associated comorbidities are independent risk factors for suicidal thoughts and behavior.^{35,36} By eight years of age, approximately 10% of maltreated children experience suicidal ideation.³⁷

Re-victimization and Dysfunctional Parenting

A childhood history of maltreatment is associated with dysfunctional interpersonal relations in adulthood. Compared to individuals who have not been abused, adults with a childhood history of abuse and neglect report twice as many subsequent sexual assaults, higher rates of domestic violence, and four times the incidence of self-harm.^{38,39} Chronic, severe maltreatment is independently associated with re-victimization, including later involvement in intimate partner violence.³⁹ This outcome may be mediated through the development of cognitive distortions, learned in the context of child maltreatment.⁴⁰ Similarly, child maltreatment independently predicts later dysfunction in parenting, including the perpetration of severe physical maltreatment⁴¹ and inappropriate maternal dependence on children for emotional fulfillment.⁴² These findings may contribute to the intergenerational transmission of maltreatment.

Adverse Societal Effects

Child maltreatment and associated morbidities independently predict child and familial dysfunction across physical, developmental, emotional, behavioral, cognitive, and social domains. Thus, maltreatment—both directly and indirectly—has a profound, adverse effect on societal health and functioning. Specifically, child abuse and neglect are correlated with increased prevalence of public health problems, including community and domestic violence, delinquency, mental health disorders, alcohol and illicit substance use, obesity, suicide, and teen pregnancy. These outcomes, in turn, correlate with increased utilization of public and private resources. For example, individuals with childhood histories of maltreatment participate in more emergency room and general medical evaluations.⁴³ They also demonstrate higher utilization rates with regard to

a “The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition™ (DSM IV) is the manual physicians, psychiatrists, psychologists, therapists, and social workers use to diagnose mental illness.

inpatient and outpatient psychiatric services, as well as surgical hospitalizations.⁴⁴⁻⁴⁶ In addition to direct healthcare costs, maltreatment and its sequelae result in incalculable expenditures across the child welfare, public and private mental health, early intervention and education, juvenile delinquency and criminal justice, public welfare, and public health systems.

Adverse Affect of Maltreatment on the Developing Child: Public Health Implications

Physiological and psychological response to stress, including maltreatment, is often adaptive, allowing for the preservation of


individual safety and integrity. With chronic or extreme traumatic exposure, this response may become highly maladaptive, resulting in further child and family dysfunction. Ultimately, child and family dysfunction impacts community and societal well-being. Thus, the optimal public health response to child maltreatment necessitates policies and practices supportive of evidence-based primary prevention efforts, early detection through screening and evaluation, prompt stabilization of child and family safety and well-being, and initiation of appropriate intervention and therapy. **NCMedJ**

REFERENCES


- 1 DeBellis, MD. Developmental traumatology: The psychobiological development of maltreated children and its implications for research, treatment, and policy. *Dev Psychopathol* 2001;13(3):539-564.
- 2 Teicher MH, Anderson SL, Polcari AN, Anderson CM, Navalta CP. Developmental neurobiology of childhood stress and trauma. *Psychiatr Clin North Am* 2002;25(2):397-426 vii-viii.
- 3 Schore, AN. Dysregulation of the right brain: A fundamental mechanism of traumatic attachment and pathogenesis of post-traumatic stress disorder. *Aust N Z J Psychiatry* 2002;36(1):9-30.
- 4 DeBellis MD, Keshavan MS, Shifflett H, et al. Brain structures in pediatric maltreatment-related posttraumatic stress disorder: A sociodemographically matched study. *Biol Psychiatry* 2002;52(11):1066-1078.
- 5 Thomas LA, DeBellis MS. Pituitary volumes in pediatric maltreatment-related posttraumatic stress disorder. *Biol Psychiatry* 2004;55(7):752-758.
- 6 Bremner JD, Randall P, Vermetten E, et al. Magnetic resonance imaging-based measurement of hippocampal volume in post-traumatic stress disorder related to childhood physical and sexual abuse—A preliminary report. *Biol Psychiatry* 1997;41(1):23-32.
- 7 Pederson CL, Maurer SH, Kaminski PL, et al. Hippocampal volume and memory performance in community-based sample of women with posttraumatic stress disorder secondary to child abuse. *J Trauma Stress* 2004;17(1):37-40.
- 8 Stein MB, Yehuda R, Koverola C, Hanna C. Enhanced dexamethasone suppression of plasma cortisol in adult women traumatized by childhood sexual abuse. *Biol Psychiatry* 1997;42(8):680-686.
- 9 DeBellis MS, Lefter L, Trickett PK, Putnam FW. Urinary catecholamine excretion in sexually abused girls. *J Am Acad Child Adolesc Psychiatry* 1994;33(3):320-327.
- 10 Shin LS, McNally RJ, Kosslyn SM, et al. Regional cerebral blood flow during script-driven imagery in childhood sexual abuse-related PTSD: A PET investigation. *Am J Psychiatry* 1999;156(4):575-584.
- 11 Lanius RA, Williamson PC, Boksman K, et al. Brain-activation during script-driven imagery induced dissociative responses in PTSD: A functional magnetic resonance imaging investigation. *Biol Psychiatry* 2002;52(4):305-311.
- 12 Beers SR, DeBellis MD. Neuropsychological function in children with maltreatment-related posttraumatic stress disorder. *Am J Psychiatry* 2002;159:483-486.
- 13 Sachs-Ericsson N, Plant EA, Blazer D, Arnow B. Childhood sexual abuse and physical abuse and the 1-year prevalence of medical problems in the national comorbidity survey. *Health Psychol* 2005;24(1):32-40.
- 14 Taylor RR, Jason LA. Chronic fatigue, abuse-related traumatization, and psychiatric disorders in community-based sample. *Soc Sci Med* 2002;55(2):247-256.
- 15 Friedman MJ, Wang S, Jalowiec JE, McHugo GJ, McDonagh-Coyle A. Thyroid hormone alternations among women with posttraumatic stress disorder due to childhood sexual abuse. *Biol Psychiatry* 2005;57(10):1186-1192.
- 16 DeBellis MD, Burke L, Trickett PK, Putnam FW. Antinuclear antibodies and thyroid function in sexually abused girls. *J Trauma Stress* 1996 9(2):369-378.; eating disorders and obesity [Johnson JG, Cohen P, Kasen S, Brook JS.
- 17 Johnson JG, Cohen P, Kasen S, Brook JS. Childhood adversities associated with risk for eating disorders or weight problems during adolescence or early adulthood. *Am J Psychiatry* 2002;159(3):394-400.
- 18 Davidson JR, Hughes D, Blazer DG, George LK. Posttraumatic stress disorder in the community: an epidemiological study. *Psychol Med* 1991;21(3):713-21.
- 19 Holmes WC, Foa EB, Sammel MD. Men's pathways to risky sexual behavior: a role for co-occurring childhood sexual abuse, posttraumatic stress disorder, and depression histories. *J Urban Health* 2005;82(1 Suppl 1):89-99.
- 20 Anda RF, Chapman DP, Felitti VJ, Edwards V et al. Adverse childhood experiences and risk of paternity in teen pregnancy. *Obstet Gynecol* 2002;100(1):37-45.
- 21 O'Leary A, Purcell D, Remien RH, Gomez C. Childhood sexual abuse and sexual transmission risk behavior among HIV-positive men who have sex with men. *AIDS Care* 2003;15(1):17-26.
- 22 Noll JG, Trickett PK, Putman FW. A prospective investigation of the impact of childhood sexual abuse on the development of sexuality. *J Consult Clin Psychology* 2003;71(3):575-586.
- 23 DeBellis MD. Developmental traumatology: A contributory mechanism for alcohol and substance use disorders. *Psychoneuroendocrinology* 2002;27(1-2):155-170.
- 24 Thompson KM, Crosby RD, Wonderlich SA, Mitchell JE et al. Psychopathology and sexual trauma in childhood and adulthood. *J Trauma Stress* 2003;16(1):35-38.
- 25 Moran PB, Vuchinich S, Hall NK. Associations between types of maltreatment and substance use during adolescence. *Child Abuse Negl* 2004;28(5): 565-574.
- 26 Epstein JN, Saunders BE, Kilpatrick DG, Resnick HS. PTSD as a mediator between childhood rape and alcohol use in adult women. *Child Abuse Negl* 1998;22(3):223-234.
- 27 Back S, Dansky BS, Coffey SF, Saladin ME, Sonne S, Brady KT. Cocaine dependence with and without posttraumatic stress disorder: A comparison of substance abuse, trauma history and psychiatric comorbidity. *Am J Addict* 2000;9(1):51-62.

- 28 Koenen KC, Moffitt TE, Caspi A, Taylor A, Purcell S. Domestic violence is associated with environmental suppression of IQ in young children. *Dev Psychopathol* 2003;15(2):297-311.
- 29 Clark DB, DeBellis MD, Lynch KG, Cornelius JR, Martin CS. Physical and sexual abuse, depression, and alcohol use disorders in adolescents: Onsets and outcomes. *Drug Alcohol Depend* 2003;69(1):51-60.
- 30 Chaffin M, Silovsky JF, Vaughn C. Temporal concordance of anxiety disorder and child sexual abuse: implications for direct versus artifactual effects of sexual abuse. *J Clin Child Adolesc Psychol* 2005;34(2):210-222.
- 31 Widom, CS. Posttraumatic stress disorder in abused and neglected children grown up. *Am J Psychiatry* 1999;156(8):1223-1229.
- 32 Ackerman PT, Newton JE, McPherson WB, Jones JG, Dykman RA. Prevalence of posttraumatic stress disorder and other psychiatric diagnoses in three groups of abused children. *Child Abuse Negl* 1998;22(8):759-774.
- 33 McLeer SV, Deblinger E, Henry D, Orvaschel H. Sexually abused children at high risk for posttraumatic stress disorder. *J Am Acad Child Adolesc Psychiatry* 1992;31(5):875-879.
- 34 McClean LM, Gallop R. Implications of childhood sexual abuse for adult borderline personality disorder and complex posttraumatic stress disorder. *Am J Psychiatry* 2003;160(2):369-371.
- 35 Ystgaard M, Hestetun I, Loeb M, Mehlum L. Is there a specific relationship between childhood sexual abuse and physical abuse and repeated suicidal behavior? *Child Abuse Negl* 2004;28(8):863-875.
- 36 Ullman SE, Brecklin LR. Sexual assault history and suicidal behavior in a national sample of women. *Suicide Life-Threatening Behav* 2002;32(2):117-130.
- 37 Thompson R, Briggs E, English DJ, Dubowitz H et al. Suicidal ideation among 8 year olds who are maltreated and at risk: Findings from the LONGSCAN studies. *Child Maltreat* 2005;10(1):26-36.
- 38 Noll JG, Horowitz LA, Bonanno GA, Trickett PK, Putnam FW. Revictimization and self-harm in females who experienced childhood sexual abuse: results from a prospective study. *J Interpers Violence* 2003;18(12):1452-1471.
- 39 Coid J, Petruchkevitch A, Feder G, Chung W, Richardson J, Moorey S. Relation between childhood sexual and physical abuse and risk of revictimization in women: A cross-sectional survey. *Lancet* 2001;358(9280):450-454.
- 40 Ponce AN, Williams MK, Allen GJ. Experience of maltreatment as a child and acceptance of violence in adult intimate relationships: mediating effects of distortions in cognitive schemas. *Violence Vict* 2004;19(1):97-108.
- 41 Famularo R, Fenton T, Kinscherff R, Ayoub R, Barnum R. Maternal and child posttraumatic stress disorder in cases of child maltreatment. *Child Abuse Negl* 1994;18(1):27-36.
- 42 Alexander PC, Teti L, Anderson CL. Childhood sexual abuse history and role reversal in parenting. *Child Abuse Negl* 2000;24(6):829-838.

FOLIC ACID.
IT'S NOT JUST FOR BABIES ANYMORE.



Taking a multivitamin with 400 mcg of folic acid every day before pregnancy can do more than prevent serious birth defects. It can help avert heart disease, stroke, even certain kinds of cancer. So even if you're not planning to become pregnant, get your daily dose of folic acid. To learn more, ask your health care provider or local health department, call 1-866-GET-FOLIC or go to www.getfolic.com.

FOLIC ACID  **GET IT NOW**

